PIT AND QUARRY

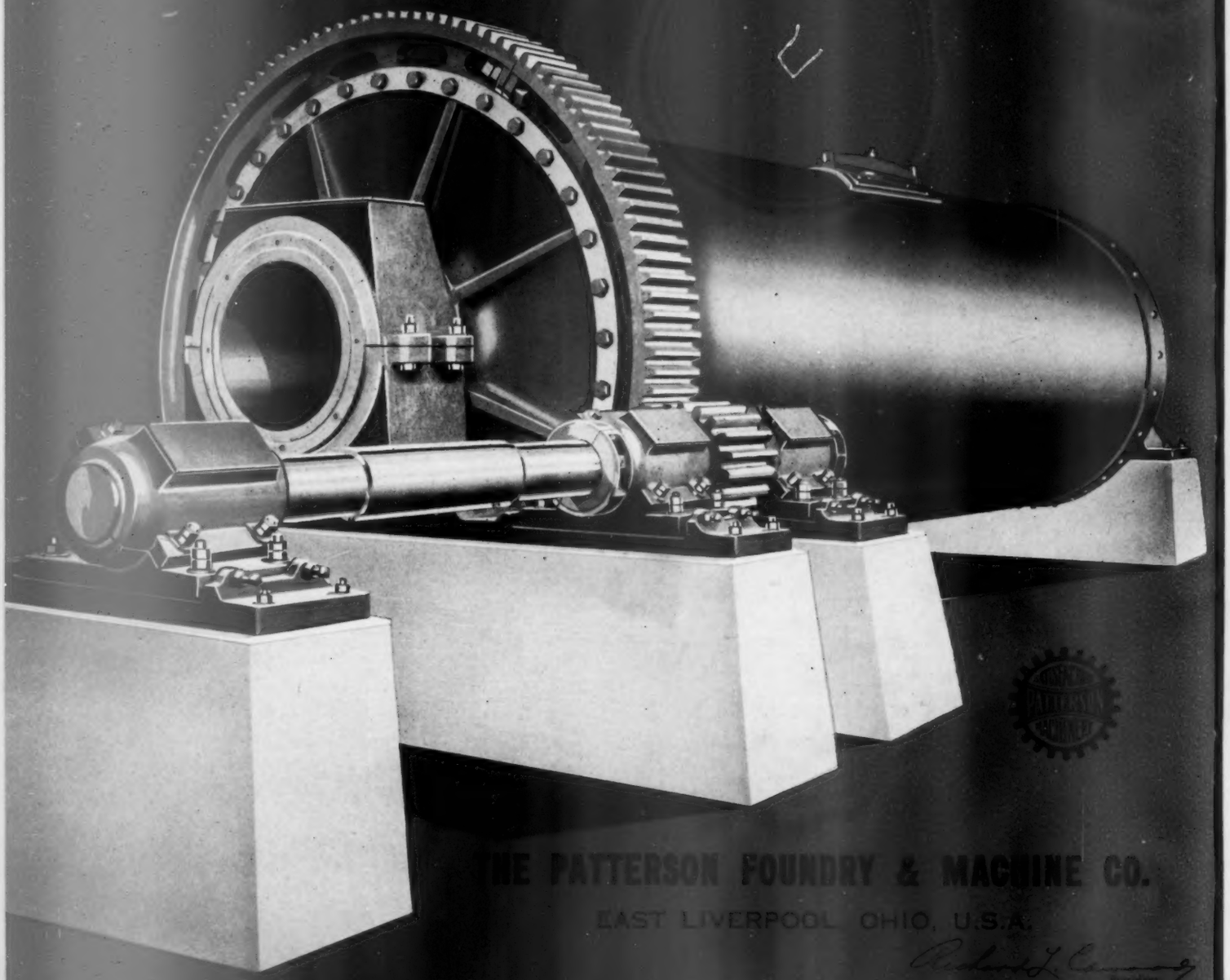
JUNE, 1937

Lime Convention Reports . . . 10 Years Without a Lost-Time Accident . . . New Bentonite Plant . . . Modern Highway Construction . . . Paper Mill Lime Plant

for RAPID GRINDING
AT LOW COST USE

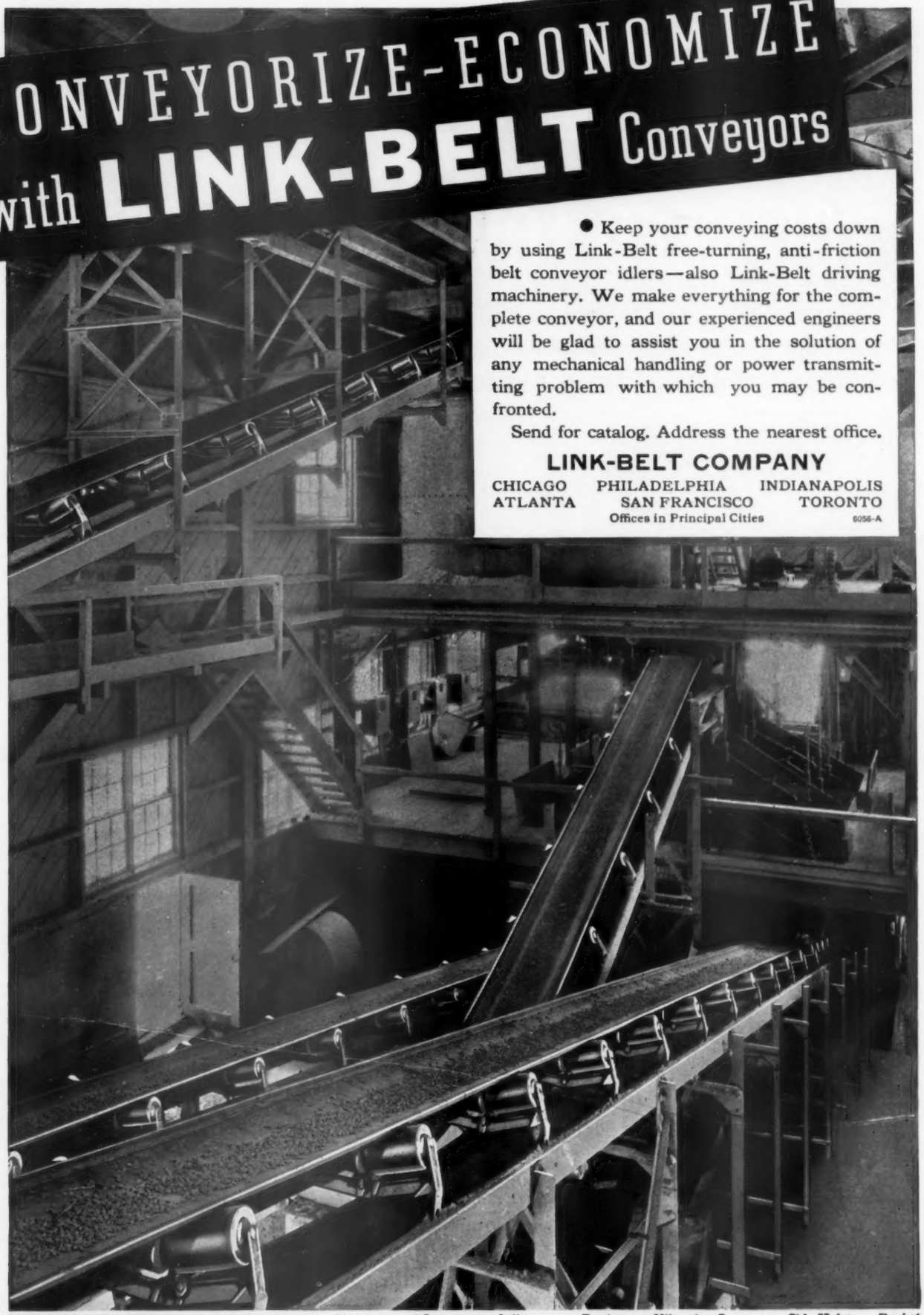
PATTERSON

BALL *and* TUBE MILLS



THE PATTERSON FOUNDRY & MACHINE CO.
EAST LIVERPOOL, OHIO, U.S.A.

CONVEYORIZE-ECONOMIZE with LINK-BELT Conveyors



● Keep your conveying costs down by using Link-Belt free-turning, anti-friction belt conveyor idlers—also Link-Belt driving machinery. We make everything for the complete conveyor, and our experienced engineers will be glad to assist you in the solution of any mechanical handling or power transmitting problem with which you may be confronted.

Send for catalog. Address the nearest office.

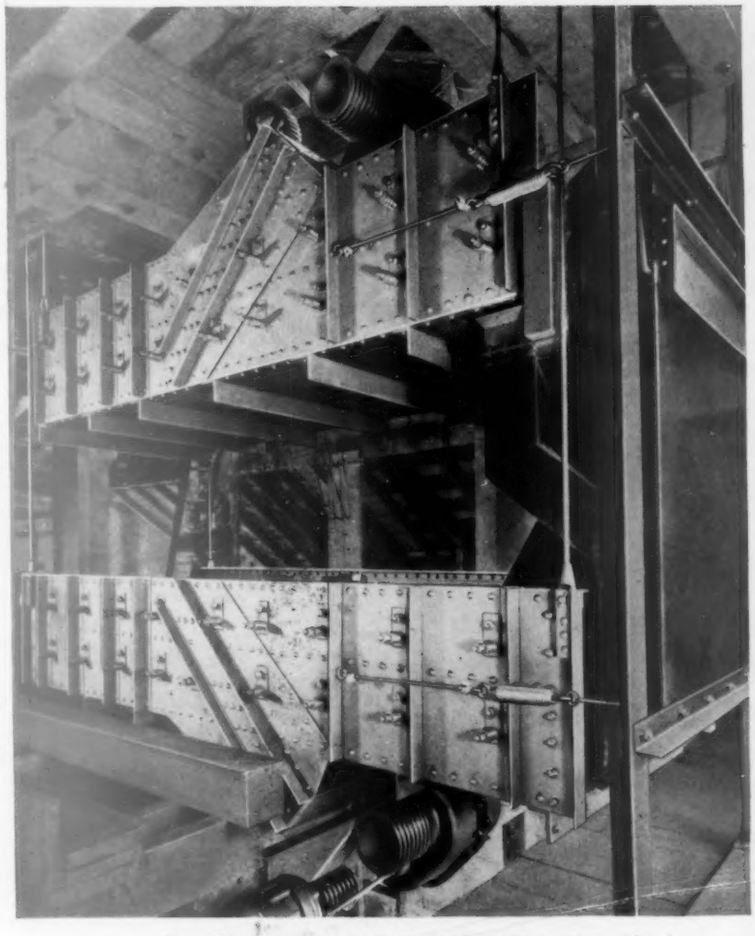
LINK-BELT COMPANY

CHICAGO PHILADELPHIA INDIANAPOLIS
ATLANTA SAN FRANCISCO TORONTO
Offices in Principal Cities 6056-A

LINK-BELT PRODUCTS Include: Belt Conveyors . . . Elevators and Conveyors of all types . . . Feeders . . . Vibrating Screens . . . Skip Hoists . . . Bucket Carriers . . . Portable Loaders . . . Speed Reducers . . . Variable Speed Transmissions . . . Silverstreak Silent Chain Drives . . . Silverlink Roller Chain Drives . . . Chain Drives of all types—Malleable Iron, Promal or Steel . . . Elevator Buckets . . . Bearings . . . Take-ups . . . Gears . . . Sprockets . . . Pulleys . . . Couplings . . . etc.

PIT AND QUARRY, June 1937. Vol. 29, No. 12. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada and Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter November 28, 1932, at the Post-Office at Chicago, Ill., under the Act of March 3, 1897. Additional entry at Milwaukee, Wis.

WHERE HEAD ROOM COUNTS YOU NEED LOW-HEAD SCREENS



Two 5' x 14' Double Deck, Heavy Duty, Low-Head Vibrating Screens Installed in a Coal Preparation Plant

762-A

The new Allis-Chalmers Low-Head Horizontal Vibrating Screens give you greater screen area in less space . . . greater tonnage of accurate size product at lower cost than older, slower moving type of screens.

Low-Head Screens, as the name suggests, take very little head room. They operate in a horizontal plane and can be installed one right under another as illustrated. This often saves expensive remodeling to obtain greater screen capacity.

Low-Head Screens are built with single, double or triple decks from 3'x6' to 6'x14' or larger. They are described in Bulletin 1478. Write for your copy. Or better still, let us show you one of these modern screens in operation.

EQUIPMENT ENGINEERS TO INDUSTRY

ALLIS-CHALMERS

MILWAUKEE WISCONSIN

TRAYLOR
all-welded
ROTARY KILNS

at West Virginia Pulp & Paper Company

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators
Welded or Riveted Stacks, Tanks and Bins for any purpose.

For many years Traylor Rotary Kilns have been classed as "tops" by Cement Plants, Chemical Plants and process industries in general, both in the United States and abroad.

One of the latest important installations by Traylor is pictured above — comprising two 8'6" x 170'0" all-welded kilns, at the new plant of the West Virginia Pulp and Paper Company, Charleston, S. C. These kilns are used for burning lime from oyster shell and for recovering lime from used calcium carbonate sludge for reuse.

The reasons why this company chose Traylor Kilns are too numerous and lengthy to be discussed here, so operators are invited to have our representative call to "talk over" their problems and requirements.

NOW is a good time to write us!

TRAYLOR ENGINEERING & MANUFACTURING CO.
ALLENTOWN, PENNSYLVANIA, U.S.A.

NEW YORK CITY 3916 Empire State Bldg. | CHICAGO 815 One La Salle St. Bldg. | SALT LAKE CITY 101 West Second South St. | LOS ANGELES 919 Chester Williams Bldg. | SEATTLE 6311 22nd Ave., N. E.

THE CANADIAN FAIRBANKS-MORSE CO., LTD. 980 St. Antoine St., Montreal, P. Q. Canada | B. C. EQUIPMENT CO. Vancouver, B. C. Canada

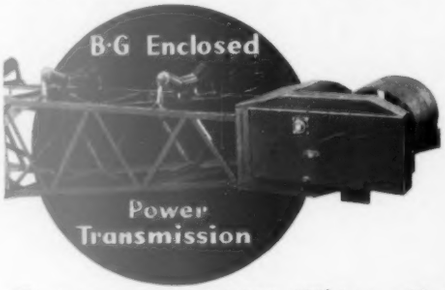
MAQUINARIA Isobel De Catolica 40, Mexico, D.F. | MANILA MACH. & SUPPLY CO. Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City. Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro

European Works—Usines Carels Freres, Ghent, Belgium

Via Barber-Greenes

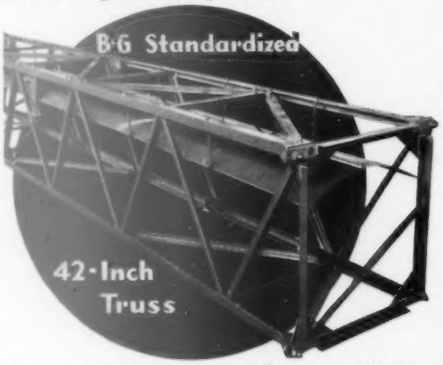
Here are two new Barber-Greenes doing a perfect job in an ideal plant.



The conveyor on the right is 160′ long, with a Barber-Greene steel truss 42″ deep. This conveyor not only has fairly long spans but carries an 8″ water pipe in addition to the walkway.

The left conveyor, which runs horizontally just above the ground, is mounted on wood stringers as no long spans are necessary.

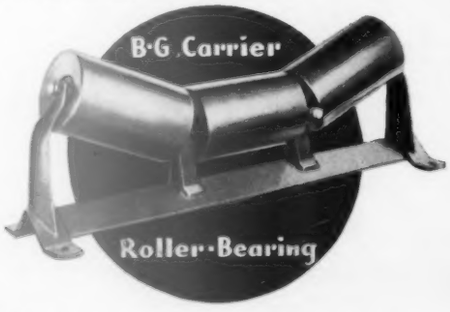
Both conveyors are driven by the new Barber-Greene enclosed transmission, an all-welded steel unit, dust tight, internally lubricated. This transmission is available in two sizes, has highest quality anti-friction bearings and precision-made steel gears and sprockets.



The new Barber-Greene 42″ deep welded steel truss has all the well known B-G advantages, standardized sectional construction, quick easy erection, etc.

The carriers on both conveyors are the finest made by Barber-Greene: Unbreakable, all-welded steel base, end brackets die formed, oversize Shafer Self-Aligning Roller Bearings. FOUR pass labyrinth grease seals keep the grease in and grit out.

The carriers alone justify your inquiry. Send a card or letter today for full information on Barber-Greene conveyors. Remember we maintain a department for the sole purpose of solving your material handling problems the most efficient, economical way. There is no obligation. Barber-Greene Company, 492 West Park Avenue, Aurora, Illinois.



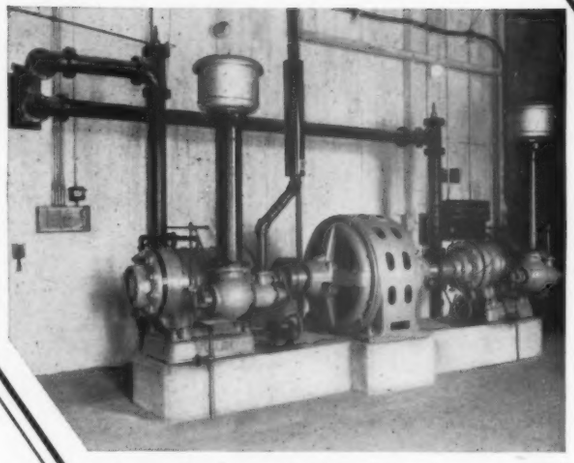
These installations were made to save money

After all, the real reason for modernizing your plant equipment is to save money and increase earnings.

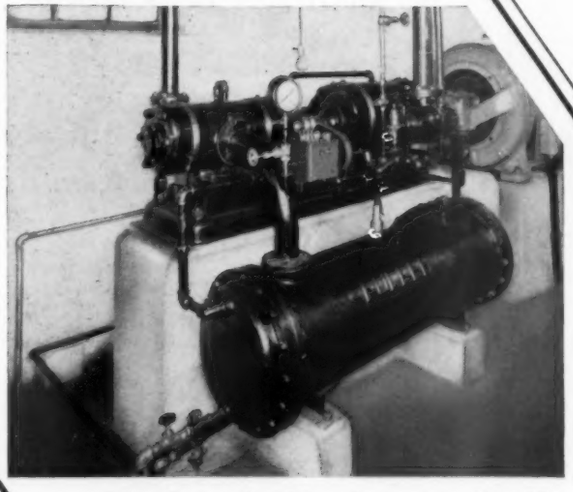
The two Fuller Rotary Air Compressor installations illustrated on this page were made, after considerable study and comparison with other types, with the express purpose of creating savings.

Fuller Rotary Air Compressors and Vacuum Pumps are built for long, severe service, at comparatively low installation and operating costs.

Modernize your plant . . . bring it up-to-date . . . investigate the savings possible through installation of Fuller Rotary Compressors and Vacuum Pumps.



Two Fuller Rotary Single-Stage Compressors, 1950-CFM free air, 25-lb. pressure, driven by a common motor. Both can be operated simultaneously or individually; in the latter case one of the compressors can very readily be disconnected from the motor.



Fuller Rotary Two-Stage Compressor, 333-CFM free air, 100-lb. pressure.

LONG LIFE
DIRECT DRIVE
LIGHT WEIGHT
NO VIBRATION
LOW MAINTENANCE
NO BEARING TAKE-UP
SMALL FLOOR SPACE
SIMPLE CONSTRUCTION
NO AIR-LINE PULSATION

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C-13

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

Cincinnati Conveyor Belt records of tonnage, service and low belt cost per ton conveyed make a good yardstick for measuring conveyor belt performance. Plant operators who have made comparisons know that. Results in their plants have proved that Cincinnati Conveyor Belts are THE BELTS for ultimate economy . . . one operator tells the other . . . more Cincinnati Belts go into service . . . and so widens the circle of "Cincinnati" users.

PERFORMANCE records of Cincinnati Conveyor Belts make them first choice of many plants in every corner of the country.

THE CINCINNATI RUBBER MANUFACTURING CO.
CINCINNATI, OHIO

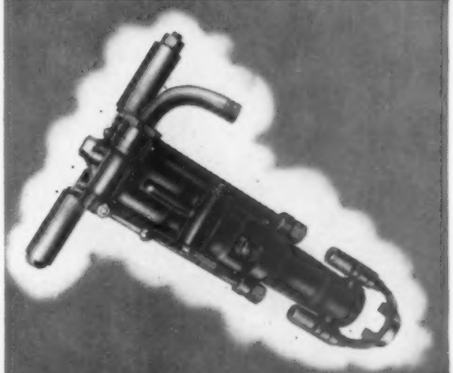
New York Atlanta Detroit Pittsburgh Boston Philadelphia Chicago Buffalo

CINCINNATI
CONVEYOR BELTS

STRENGTH FOR HARD DRILLING

AND A Thor COCHISE ROCK DRILL FOR EVERY JOB

No. 70 ONE OF THE MANY THOR ROCK DRILLS



No. 38 ANOTHER OF MANY THOR ROCK DRILLS

★ Where the drilling is tough Thor Rock Drills prove their extra worth. For Thor drills are built with the strength to produce under the most gruelling conditions. The long and powerful piston stroke results in more footage per minute. Thor air cushioning assures smoother operation; there is no hard-to-handle back-kick. Nor do you pay for Thor's extra power with extra air consumption, for the famous Thor valve design uses more of the air entering the machine and results in lower operating costs.

You can prove these points yourself on your own job. Ask a Thor representative to help you make the test. See how a Thor Rock Drill (and there's one for every job in the complete Thor line) can increase production even where the drilling is the hardest.

Thor representation is widespread with Branches, Dealers and Service Stations located in every principal city

INDEPENDENT PNEUMATIC TOOL CO.
600 WEST JACKSON BLVD., CHICAGO, ILLINOIS
COCHISE ROCK DRILL MFG. CO. (Division) 6200 E. SLAUSON AVE., LOS ANGELES, CAL.

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LONGER WEARING!

TISCO

MANGANESE STEEL Elevator and Conveyor Chain

No conveyor chain material combines *strength* and *resistance-to-wear* to such high degree as does genuine manganese steel. Severe and constant impact and dragging only tend to toughen the surface of manganese... increase its resistance to punishment. And in no manganese steel chain are these qualities so pronounced as in genuine TISCO. For TISCO chain is designed with sections of high strength...to withstand heaviest loads... and careful control in every step of steel manufacture assures the toughness and long wear for which TISCO Manganese Steel is universally famous. Assure long, economical wear, by making sure your chain and sprockets are genuine TISCO.

TW

Get longer wear from repair parts by specifying TISCO

TISCO offers a complete service on repair parts for mines, quarries and cement plants. It includes . . . dredge buckets . . . dippers . . . dipper teeth . . . power shovel parts . . . grinder, crusher and pulverizer parts . . . sprockets and chain . . . grinding balls . . . welding rod, etc.

TAYLOR-WHARTON IRON AND STEEL COMPANY

HIGH BRIDGE, NEW JERSEY

PLANTS AT HIGH BRIDGE, N. J. — EASTON, PA.

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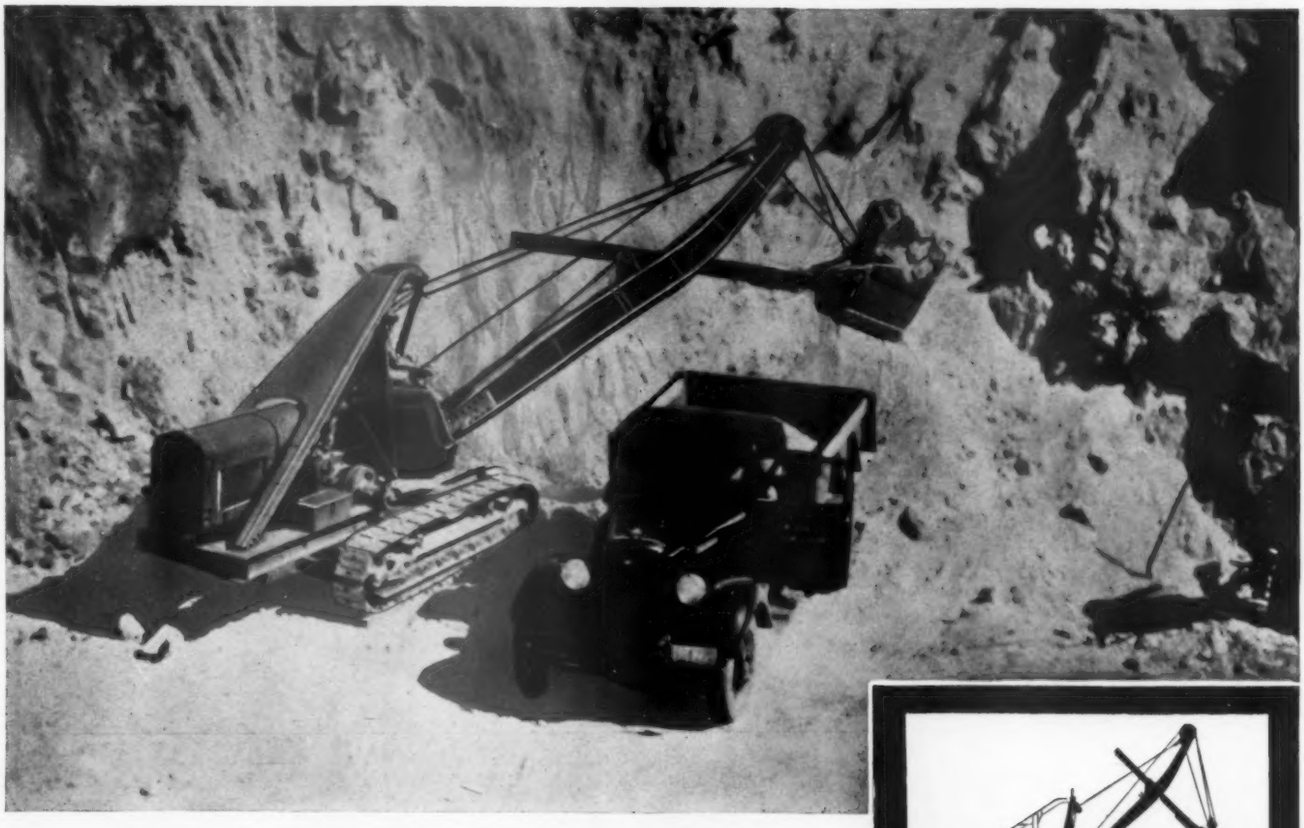
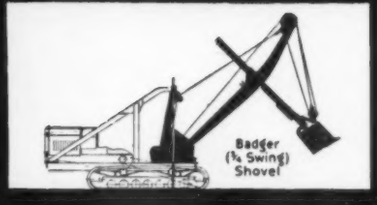
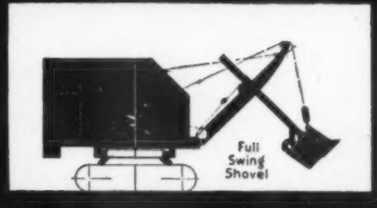
Now you can say "Good-Bye" to SLOW-MOTION SHOVELS







Parts shown above in black represent the mass moved on every swing. With ample power and minimum "dead weight" the Badger makes more swings per hour.

A-W 1/2 cu. yd. Badger OUTPERFORMS because it Starts—Stops—Swings faster

YOU'LL get new low production costs when you put an A-W Badger to work in the place of a slow-motion shovel.

The A-W Badger has brilliant, flashing performance—stops—starts—swings faster—for the stronger, lighter weight swinging structure avoids inertia at the start and momentum on the end of a swing. It can—*and does* outperform.

Scientific weight distribution and low center of gravity holds it steady in hard going. No tail swing—works in "tight" places. Plenty of reach, and abundance of power.

Send today for literature.

AUSTIN-WESTERN ROAD MACHINERY CO.
AURORA, ILLINOIS

The Austin-Western Road Mach. Co., A-7 Aurora, Ill.

☐ Send a salesman
Tell me more about the

☐ Badger Shovel	☐ Crushing & Washing Plants
☐ Motor Grader	☐ Elevating Graders
☐ Roll-A-Plane	☐ 5 Yd. Scraper
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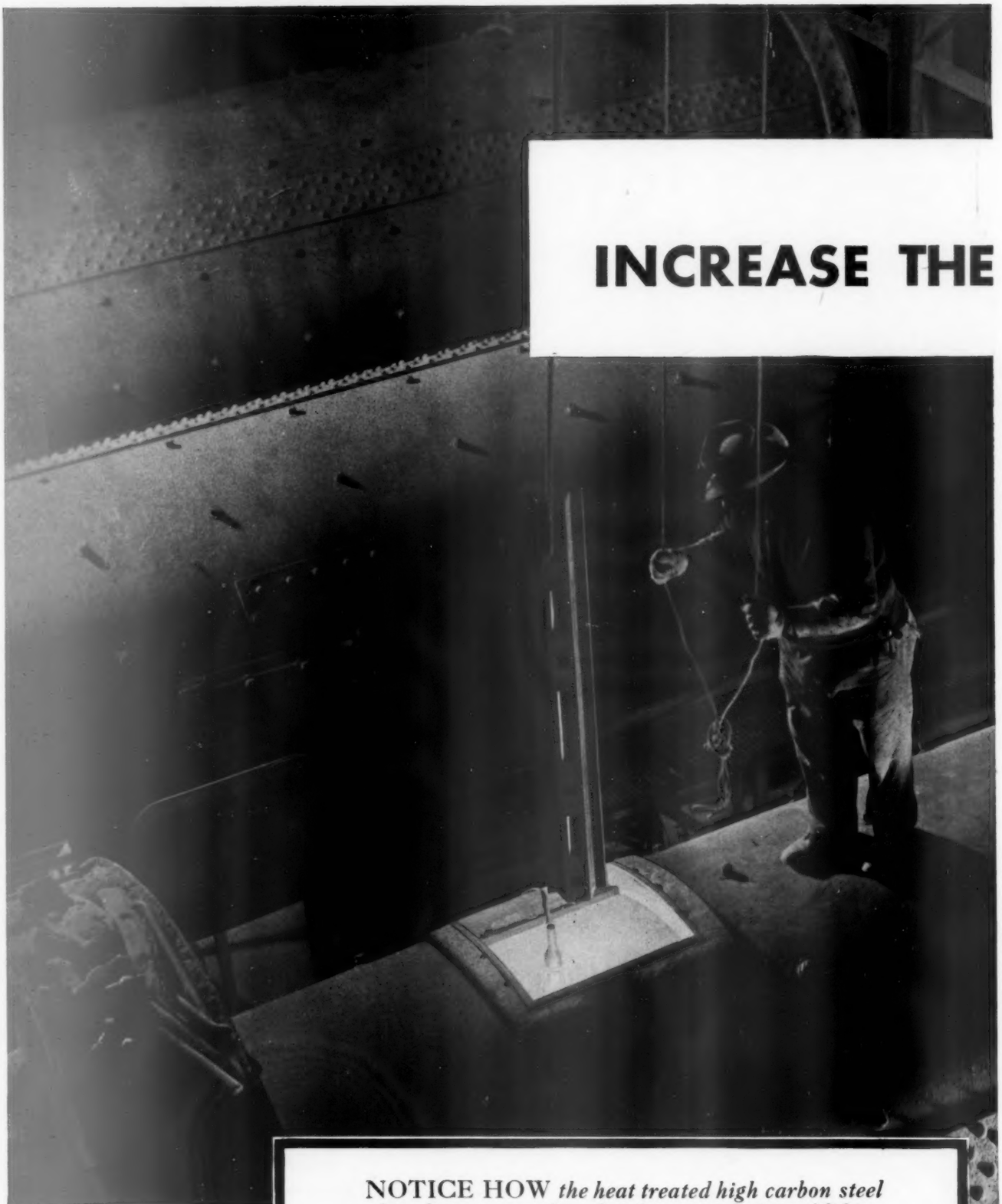
Austin-Western



INCREASE THE

NOTICE HOW *the heat treated high carbon steel plate linings are chamfered to suit design of lifting bars. Wash against mill shell is thus reduced.*

"*Pay-Load*" OF YOUR MILLS

. . . *with this NEW Rolled Steel Plate Lining*

THE long-wearing qualities of Carnegie-Illinois Controlled high carbon steel in the new USS Lorain Rolled Steel Plate Lining permit a reduction in the thickness of lining for ball, tube, and compartment tube mills, when compared with cast linings. This reduction in the thickness of the lining results in a proportional increase in the volume of the mill available for grinding purposes. It assures either an increase in the output of the mill, improved fineness of the finished product, or both, with a decrease in the horsepower per unit of grind.

EASIER TO INSTALL

Lighter weight in the mill is accomplished with an increase in structural strength. This reduction in weight, together with the easy system of locking plates and lifting bars into place, makes installation quicker and less costly than with older style cast lining plates.

LIFTING ACTION RENEWED

When you use USS Lorain Rolled Steel Plate Lining, the lifting bars themselves can be reversed or replaced, as shown in the illustration, without changing the liner plates. Reversing the bars after long service places the less-worn lifting surface on the working side . . . thus renewing the full lifting action of the bars.

ADAPTABLE TO YOUR GRINDING PROBLEMS

With USS Lorain Plate Lining there is no limitation in the design of the lifting bar, nor in the thickness of the rolled steel plate lining. Both can be adapted to the type of grind, size of grinding balls, and size of mill. Our experienced engineering staff will be glad to make a study of your grinding equipment and problems. They can make definite recommendations for more efficient operation of your mills through the use of USS Lorain Rolled Steel Plate Lining.

U·S·S LORAIN ROLLED STEEL PLATE LINING

CARNEGIE-ILLINOIS STEEL CORPORATION

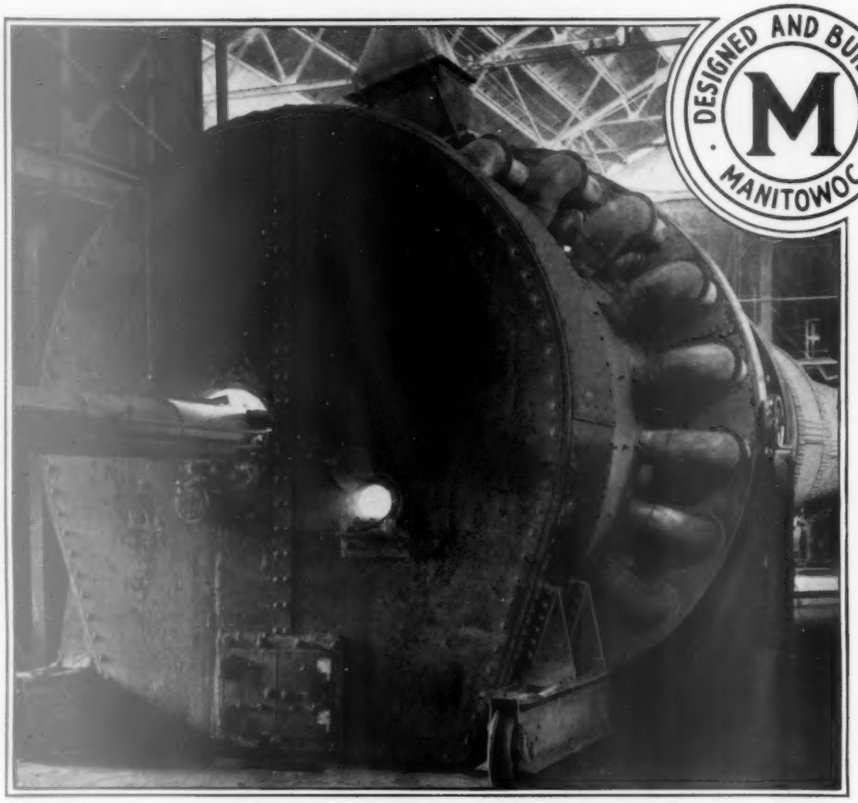
Lorain Division · Johnstown, Pa.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Vanderwerp Recuperator

for Rotary Kilns



Correct in Principle

Proved in Practice

The VANDERWERP RECUPERATOR alone meets the full requirements of kiln operators:

Because:

The maximum of heat recovery is obtained, since the heat exchange between clinker and combustion air takes place within the kiln, thoroughly insulated against radiation losses.

It has been demonstrated that the quality of the cement is greatly improved by rapidly air quenching the clinker at its maximum temperature. The beneficial effects thus obtained upon the structure of the clinker and upon the relationships between its various constituents are now generally recognized to be of very great importance.

Write, without obligation, for full particulars

MANITOWOC ENGINEERING WORKS

Division of

Manitowoc Ship Building Company

GENERAL OFFICES AND PLANT
Manitowoc, Wisconsin

CHICAGO OFFICE
131 E. River St.

With this NEW BUFFALO PLAN, You need no longer Put Off having the PROFIT INSURANCE of NEW BUFFALO SCALES with low cash outlay

You can now have the profit insurance of accurate Buffalo Scales as easily as you can buy motor trucks and other heavy equipment.

This Buffalo Scale Plan gives you modern, accurate scale equipment with low cash outlay . . . it distributes the cost over a period of time . . . it leaves working capital available for handling increased business . . . it helps you protect your profits by selling by weight instead of bulk.

Series 3200 Buffalo Scales provide AND MAINTAIN accuracy under heavy truck service. Exclusive single link construction . . . extreme strength . . . built to last for years, not months, Buffalo Scales give you the results of 76 years of specialized scale building experience.

Write for Bulletin illustrating every feature of Buffalo Scales, and full information on how this Buffalo Plan helps you install them immediately with low cash outlay.

BUFFALO SCALE CO. Buffalo N.Y. U.S.A.

ESTABLISHED 1861

BUFFALO SCALE COMPANY

1200 Niagara Street BUFFALO, N. Y., U. S. A.

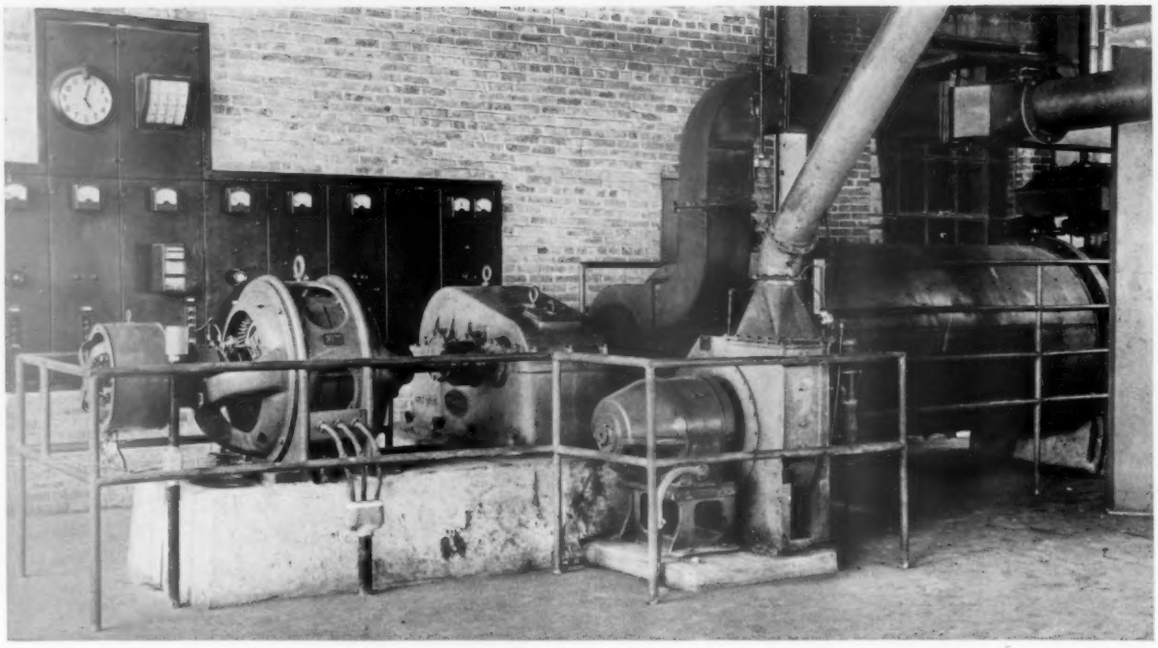
Buffalo Cleveland New York San Francisco
Chicago Detroit Philadelphia St. Louis
Los Angeles Pittsburgh

Cutaway view of latest type Buffalo Scale showing exclusive Single Link construction. Structural Bridge design and minimum excavation and foundation required.

CHEMICAL LIME FIRES ROTARY KILN WITH AIR-FLOATED SUPERFINE PULVERIZED COAL

98.4% thru 200 Mesh

From Kennedy Air Swept Tube Mill



LIME-COAL RATIO 5.75 to 1

Another Proof that the Kennedy Air Swept Tube Mill is the King of Fine Grinders.
Kennedy Mills Also Grinding Lime to 99% thru 325 Mesh.

CONSULT US FOR MAKING BETTER PULVERIZED PRODUCTS AT LOWER COSTS

KENNEDY-VAN SAUN

MFG. & ENG. CORPORATION

TWO PARK AVENUE NEW YORK, N. Y.

STRENGTH

you can't buy in any other Shovel, Crane or Dragline!

This is the rotating base of a ⅜ yd. shovel—not an ordinary ⅜ yd. shovel but a *Northwest* ⅜ yd. shovel.

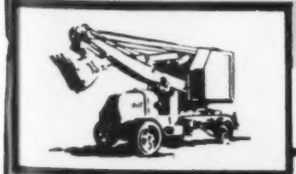
It is a sturdy, solid, *one piece* alloy steel casting. It has years of service written all over it.

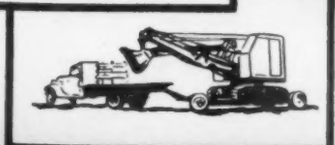
Here is design that assures absolute alignment of all shafts and bearings and eliminates weaving that causes excessive wear—a far superior construction to the structural frame work offered by many manufacturers.

Northwests are light enough to go anywhere, yet employ such heavy duty construction as to be able to bring greater profits to jobs that other lighter machines of the same so-called capacity cannot handle.

Let us prove that Northwest design and construction will mean more profit on your next job. We can—and will!

NORTHWEST ENGINEERING COMPANY
1822 Steger Bldg., 28 E. Jackson Blvd. Chicago, Ill.



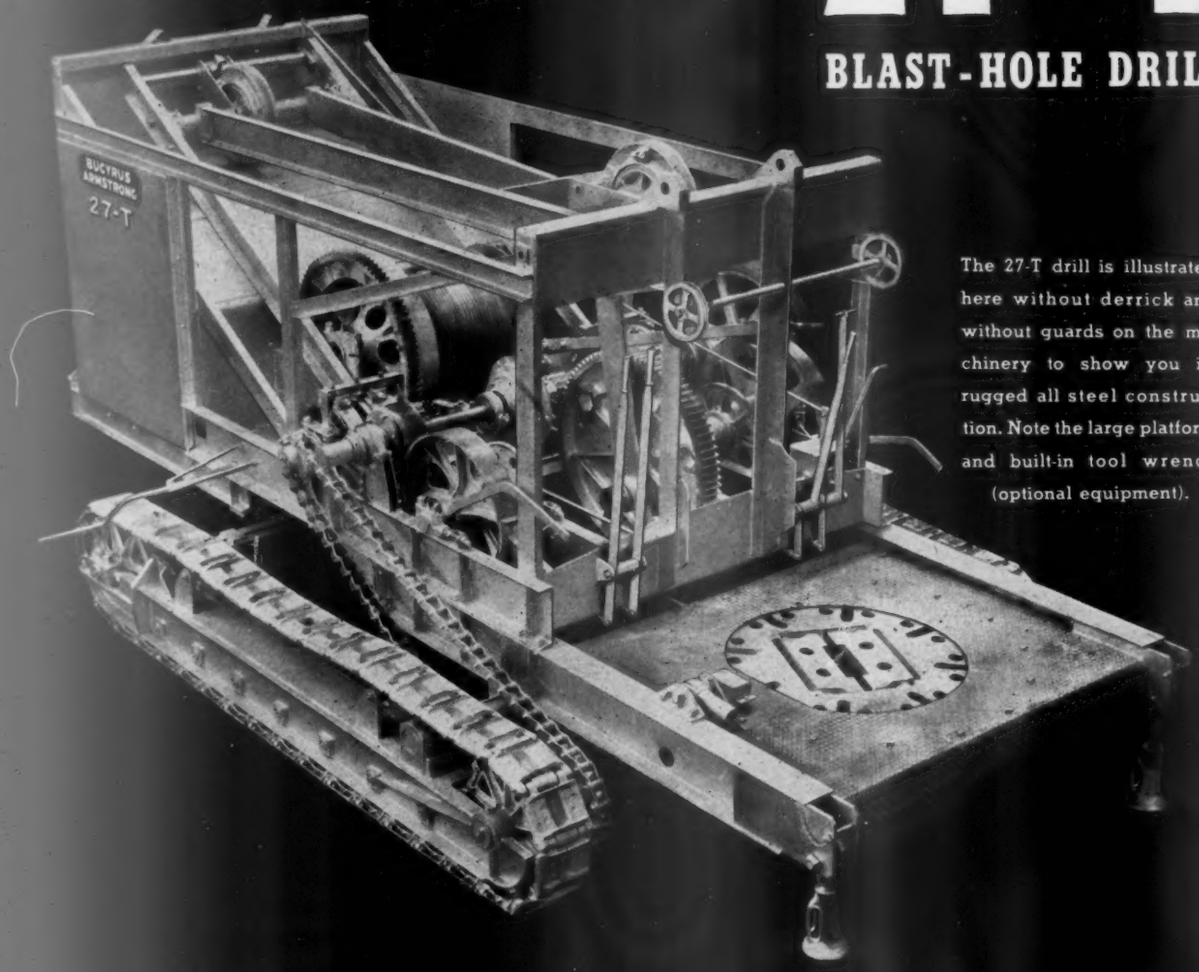


NORTHWEST

The World's Largest Exclusive Builders of Shovels, Cranes and Draglines

Here it is . . .

THE 27-T
BLAST-HOLE DRILL



The 27-T drill is illustrated here without derrick and without guards on the machinery to show you its rugged all steel construction. Note the large platform and built-in tool wrench (optional equipment).

THERE is no better way for you to *modernize* your blast-hole drilling equipment than with the NEW Bucyrus-Armstrong 27-T — revolutionary in design and modern in every detail, a machine that is literally "years ahead" in drilling performance and economy. The 27-T blast-hole drill embodies many new and exclusive features to be found on no other machine near its price class, together with the many outstanding mechanical and operating developments that have made Bucyrus-Armstrong drills leaders in the field for more than 70 years. Send for big, illustrated bulletin describing this new machine. Go *modern* with the 27-T!

BUCYRUS-ERIE

BUCYRUS ARMSTRONG

DRILLING, EXCAVATING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U. S. A.

9½ CUBIC YARDS ON A GALLON OF FUEL

$8.90 SAVED EACH 10-HOUR DAY

EVEN though you may have cut your stone-crushing and gravel-screening costs "down to the bone," "Caterpillar" Diesels, in place of other types of power, can cut them *still further*. Edward Kraemer's figures offer proof: With two of these sturdy, highly efficient Diesel engines, operating on low-cost fuel, his records show *savings of $8.90 per day* as compared with the gasoline engines he previously used. Really a worth-while profit gain for a plant of its size—a rate of saving that can soon repay the initial cost of one or two good-sized "Caterpillar" Diesel Engines and thereafter leave the owner "in the clear."

"Caterpillar" Diesel Engines are not only unequaled in low operating and maintenance costs . . . with their high standard of quality, large-volume production makes them comparatively low priced as well — for these engines are used in thousands of tractors and road machines, in the equipment built by 83 machinery manufacturers, and by hundreds of other power users.

SEVEN ENGINE SIZES

—from 44 to 160 hp. Full information is available through the nearest dealer or by writing direct to us.

Crushing plant of Edward Kraemer, Plain, Wisconsin — using an 80-hp. "Caterpillar" Diesel Engine at each end.

CATERPILLAR DIESEL ENGINES

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CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES

"Appearances may be deceiving, but the lower upkeep expense of welded construction has proved a big saving to us."—Ray Goetzel.

Why this WELDED CARBODY *is far better*

P&H Pacemakers-FASTER ON THE JOB

● No bolts — no rivets to work loose or shear. Electric welding of new high tensile steels makes it far lighter — yet actually stronger. The P&H carbody and crawler frames are welded into one rigid unit to insure perfect alignment of driving machinery . . . . to save repair bills. This advanced construction, now being adopted by others, was introduced by the Harnischfeger Corporation.

4451 W. National Ave., Milwaukee, Wis.

Warehouses and Service Stations:
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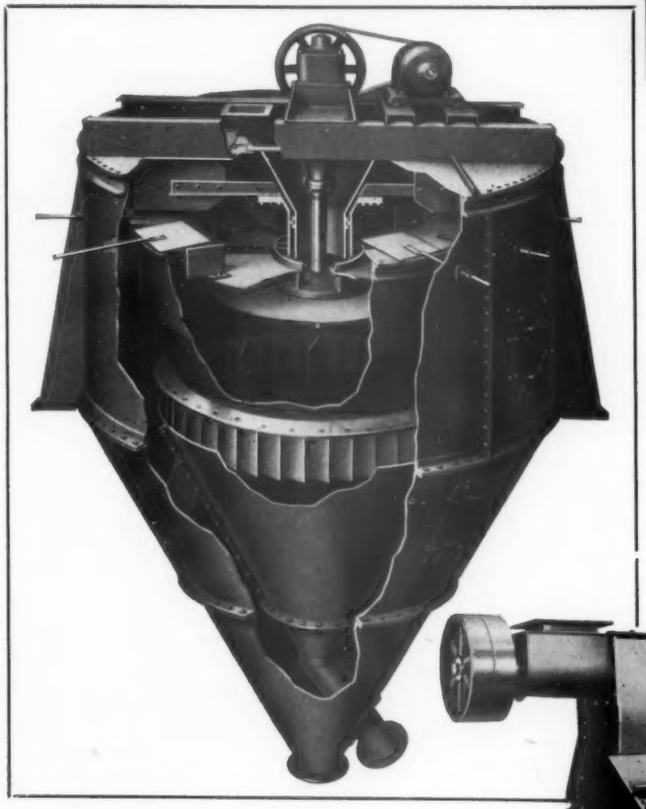
HARNISCHFEGER
CORPORATION

EXCAVATORS • ELECTRIC CRANES — FOUNDED IN 1884 — QUALITY P&H SERVICE — HOISTS • MOTORS • ARC WELDERS

STURTEVANT SIZING SPECIALISTS



WHATEVER your sizing problem, you will find the answer in Sturtevant experience and equipment, which cover the full range of material sizing . . . from the coarser grading of from ¼" to 50 or 60 mesh by vibrating screens up to the fine classification by air-separation to 350 mesh and the micron sizes.

Sturtevant began building screens in the 80's . . . introduced their toggle, hexagonal and revolving types in 1901 . . . developed the first inclined vibrating screen in 1907 (now the Moto-Vibro) and pioneered air separators in 1919 for extremely fine separation.

With this broad background and the experience of years in screening and air separating practically all the separable materials, Sturtevant engineers can give you unprejudiced advice in applying the proper type of equipment to your requirements.

Modern Air Separators for separating dry materials to finenesses ranging from 50 or 60 mesh to the micron sizes.

Entirely enclosed Moto-Vibro Screens with a vibrating principle that accurately screens from ¼" to 50—60 mesh.

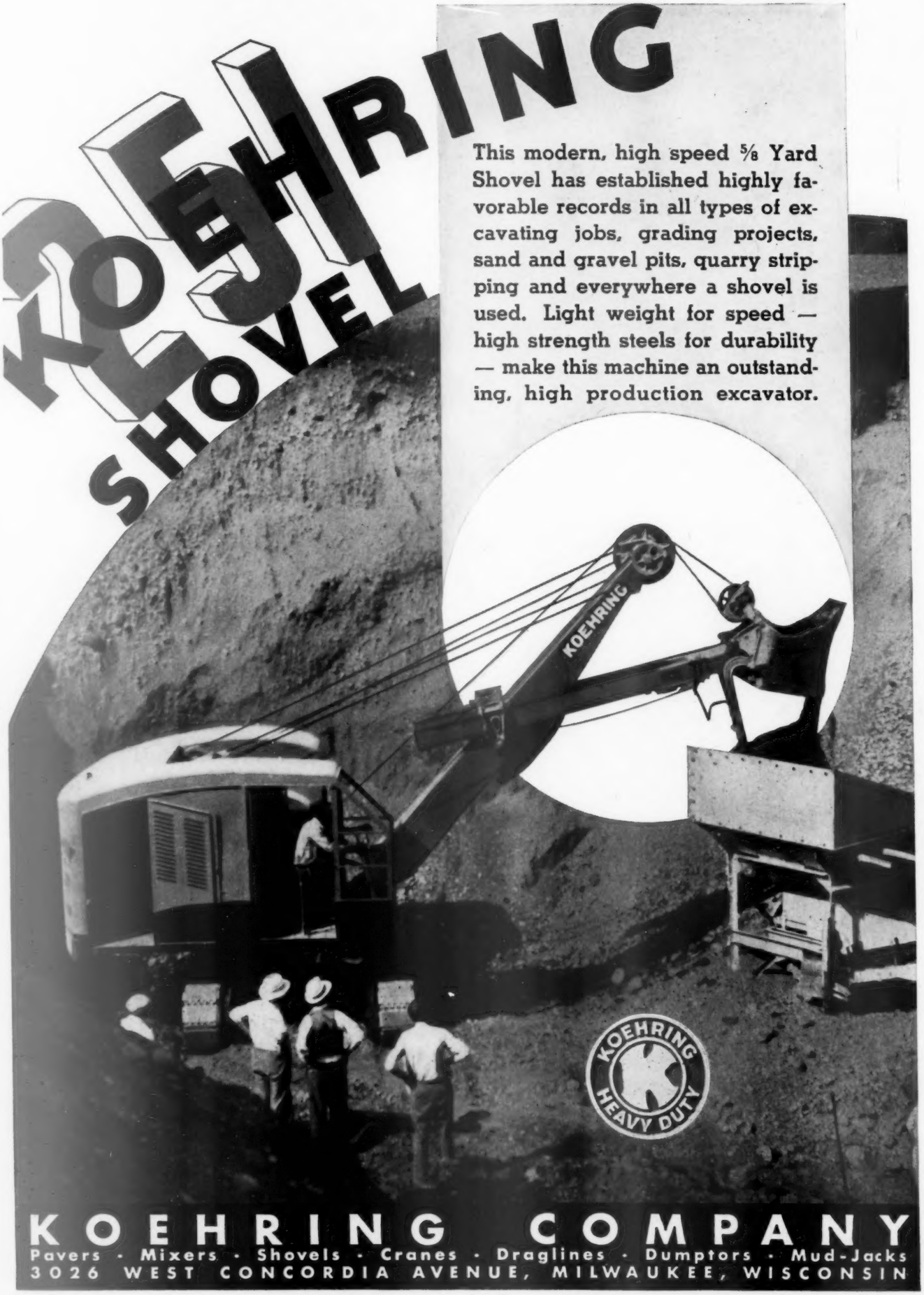
Write for Bulletin on the Sturtevant line of Crushers, Grinders, Pulverizers, Mixers, Screens, Air separators etc.

1883 **STURTEVANT** 1937

Dorchester MILL CO. Boston, Mass.

KOEHRING SHOVEL

This modern, high speed ⅝ Yard Shovel has established highly favorable records in all types of excavating jobs, grading projects, sand and gravel pits, quarry stripping and everywhere a shovel is used. Light weight for speed — high strength steels for durability — make this machine an outstanding, high production excavator.



KOEHRING COMPANY

Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks

3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

TUBE MILLS
Always Grind Better
When Woven Screens Control Both Feed and Product

Removing from the feed that last 5% of oversizes will reduce by 15% to 25% the work to be done and the time required in process.

And minute feed adjustments are possible with woven screens which cannot be accomplished with other sizing mediums.

Selective grinding, too—and overgrinding—can be positively controlled with proper screen equipments.

"Getting Results with Ludlow-Saylor Screens" is a 200-page summary of America's latest achievements in screening practice and screen-control of process operations.

A copy will be sent free upon request to any reader of Pit and Quarry

LUDLOW-SAYLOR WIRE CO.
610 S. Newstead Ave.
St. Louis, Mo.

Please send us Book No. 48-E "Getting Results."

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The LUDLOW-SAYLOR WIRE COMPANY ST. LOUIS
610 S. NEWSTEAD AVE.

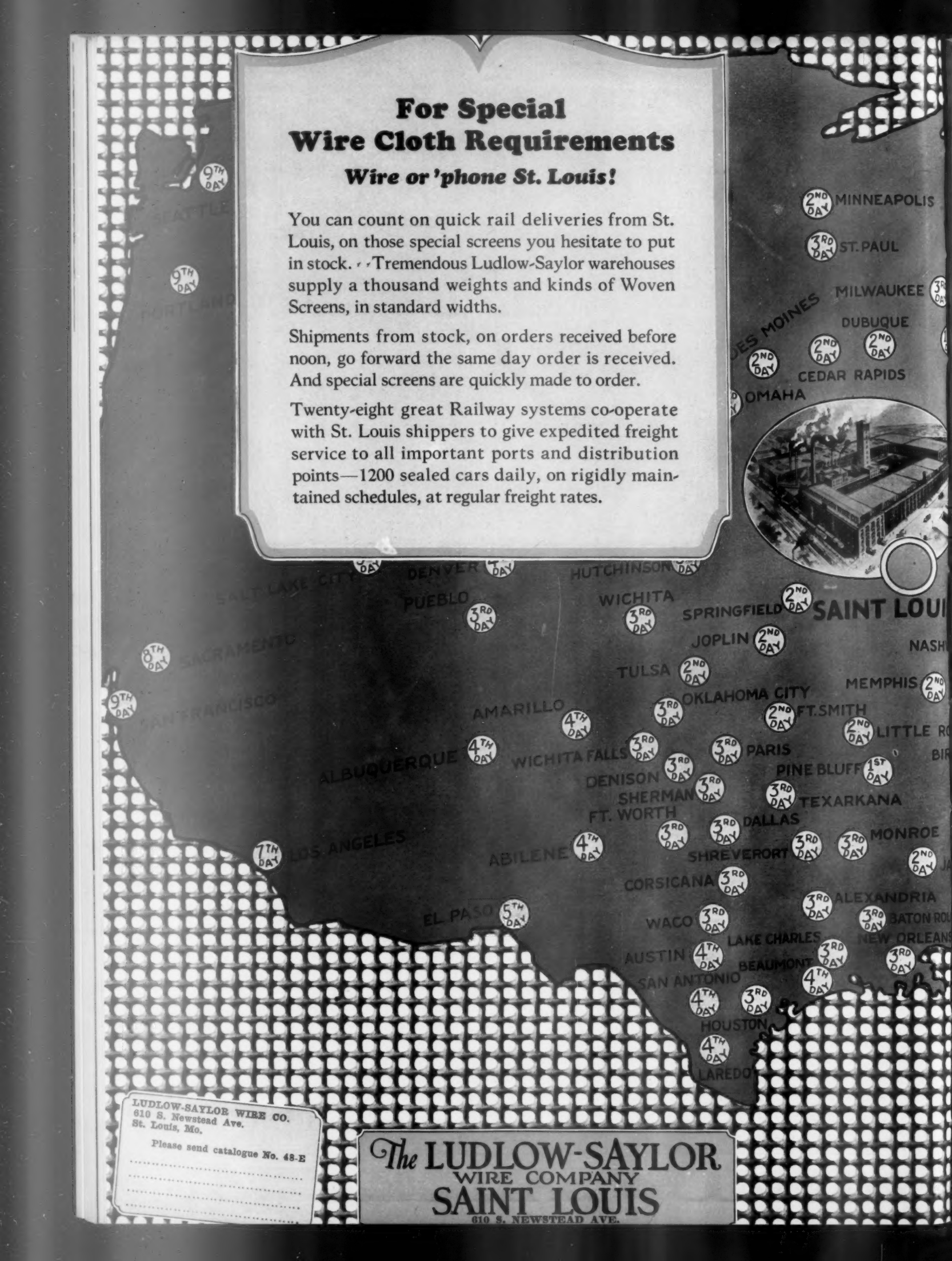
For Special Wire Cloth Requirements

Wire or 'phone St. Louis!

You can count on quick rail deliveries from St. Louis, on those special screens you hesitate to put in stock. . . Tremendous Ludlow-Saylor warehouses supply a thousand weights and kinds of Woven Screens, in standard widths.

Shipments from stock, on orders received before noon, go forward the same day order is received. And special screens are quickly made to order.

Twenty-eight great Railway systems co-operate with St. Louis shippers to give expedited freight service to all important ports and distribution points—1200 sealed cars daily, on rigidly maintained schedules, at regular freight rates.



LUDLOW-SAYLOR WIRE CO.
610 S. Newstead Ave.
St. Louis, Mo.

Please send catalogue No. 48-E

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The LUDLOW-SAYLOR
WIRE COMPANY
SAINT LOUIS
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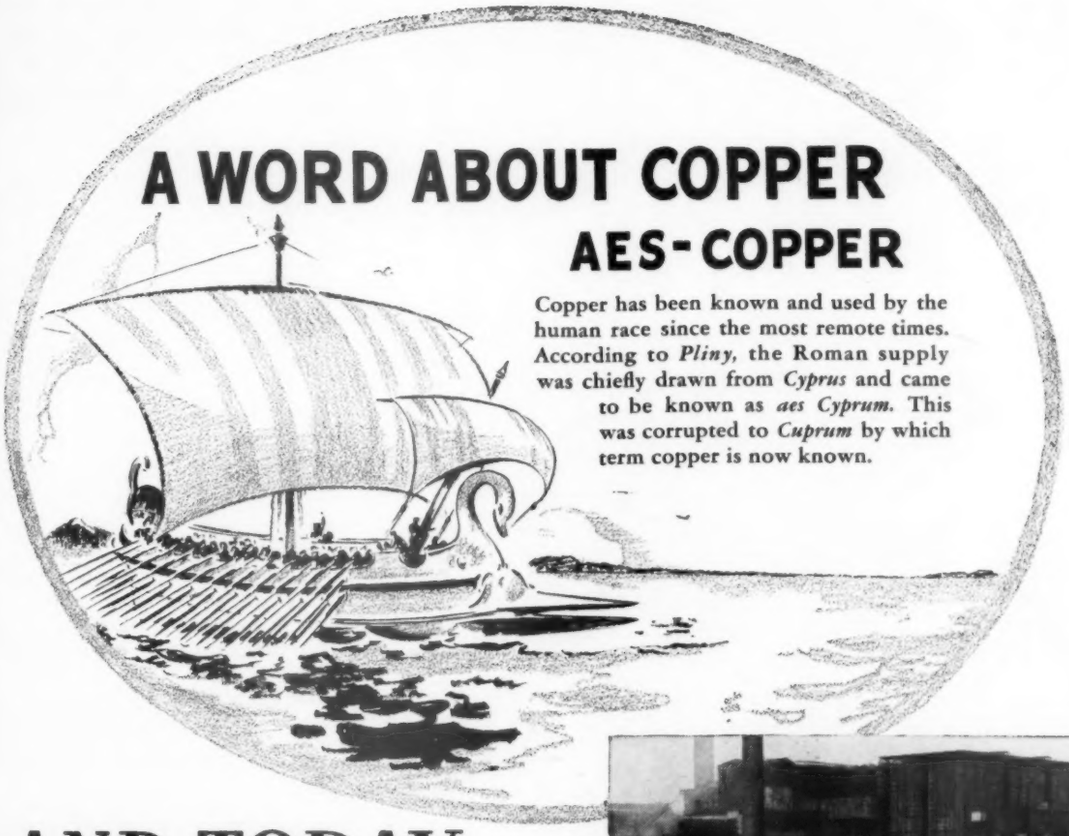


A WORD ABOUT COPPER

AES-COPPER

Copper has been known and used by the human race since the most remote times. According to *Pliny*, the Roman supply was chiefly drawn from *Cyprus* and came to be known as *aes Cyprum*. This was corrupted to *Cuprum* by which term copper is now known.

AND TODAY.. *at the* TENNESSEE COPPER CO.

The advance in metallurgical knowledge is clearly exemplified. What were once useless by-products of copper are now converted to profitable use. Although Tennessee Copper Company does ship some copper, its main product is sulphuric acid.

This company is famous for the excellence of its organization and for its efficiency. Every operation is carefully supervised and its safety department is one of the finest in the country.

As a result of constant attention to detail, misfires in the mines have been reduced to a minimum.

Ensign-Bickford Safety Fuse is used throughout blasting operations, for like hundreds of other operators, Tennessee Copper has learned that Ensign-Bickford Safety Fuse is dependable.

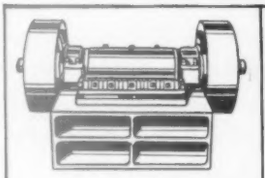
Ensign-Bickford Safety Fuse is made under rigid laboratory control—to definite standards established after a century of experience and research. Like the Tennessee Copper Company, Ensign-Bickford stands for Quality—Preparation—Knowledge. Safety Fuse is always available in a number of standardized brands, each made for a particular set of conditions.

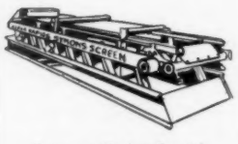
Write for the Safety Fuse Book. It shows how most blasting troubles and accidents may be avoided.

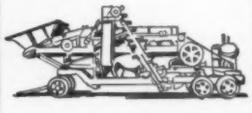
ENSIGN-BICKFORD SAFETY FUSE

THE ENSIGN-BICKFORD CO. SIMSBURY, CONNECTICUT

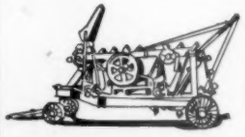
SF65


Jaw and Roll Crushers


Symons-Cedar Rapids Vibrator Screens


Portable Rock and Gravel Plants

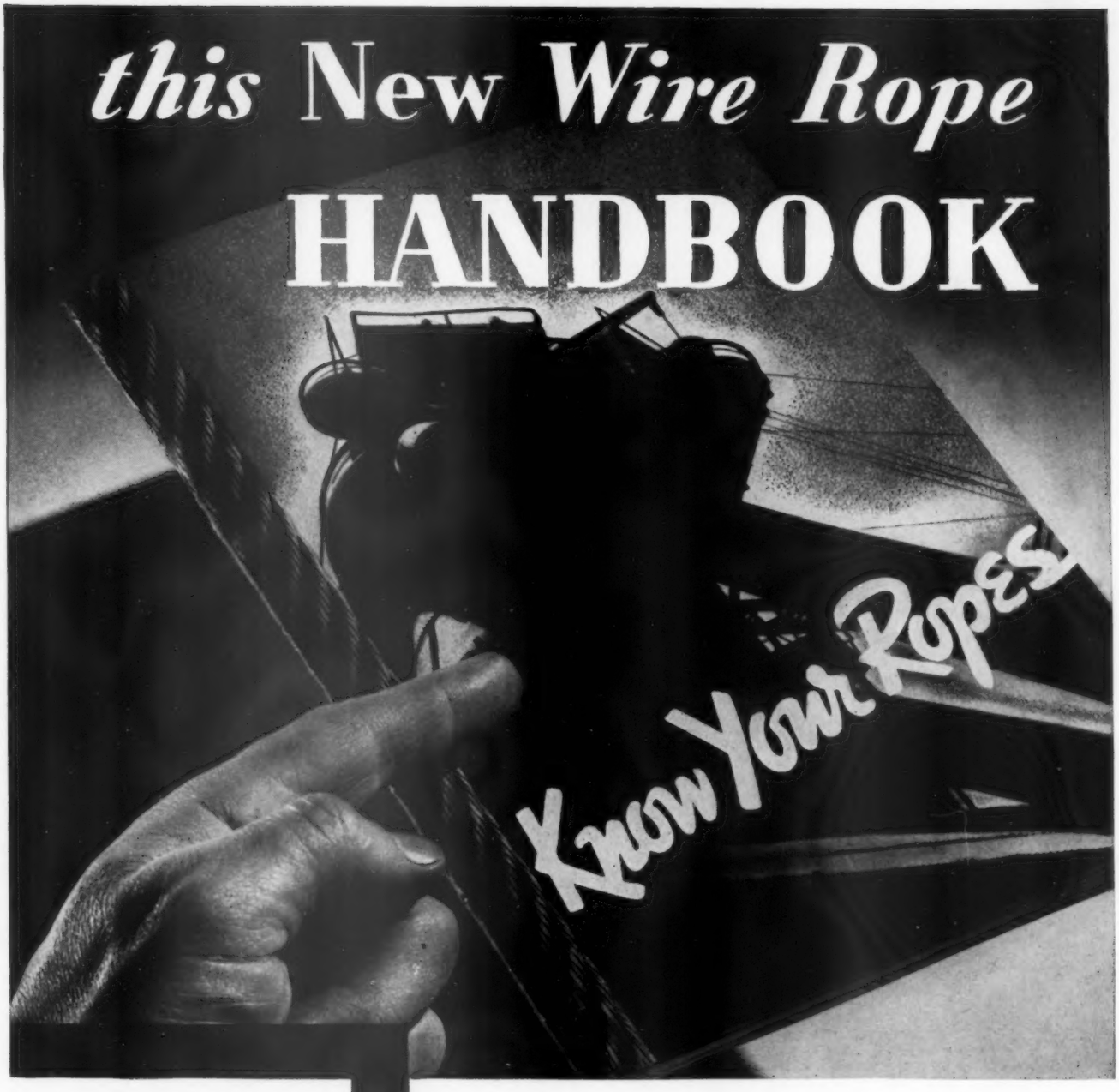
Roadmix and Rapidmix Bituminous Mixing Plants


Portable Crushers

IOWA MANUFACTURING CO.

CEDAR RAPIDS, IOWA

"Performance Is What Counts"



80 PAGES

of valuable, easy reading information on how to make wire rope yield longer service through proper selection and care when in use. Not one line of advertising. If you have not already made your request, fill in the coupon below and receive a complimentary copy. IT WILL SAVE YOU MONEY.

WIRE ROPE by Wickwire Spencer

WICKWIRE SPENCER STEEL COMPANY
41 East 42nd St., New York City

Please send me a complimentary copy of your new wire rope handbook "Know Your Ropes".

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Firm_____

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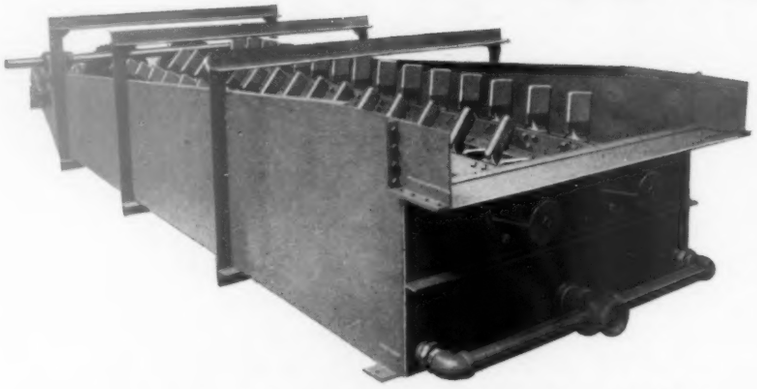
WASHERS
AND DE-WATERERS



We also build Single and Double PADDLE TYPE LOG WASHERS for the difficult clay ball removal problems, as well as the Spiral Screw Type illustrated by cut on this page. The Paddle Type Log machines have all the features of design and operation used in the Spiral Screw Type.

Let us send full details of any of these machines. Simply advise what your problem is, whether washing sand or gravel, and what your capacity requirements are. We will conduct a thoro investigation without obligation on your part, and if an EAGLE will solve your problem we will recommend the proper machine and guarantee performance. Fair enough, isn't it?

WRITE TODAY!

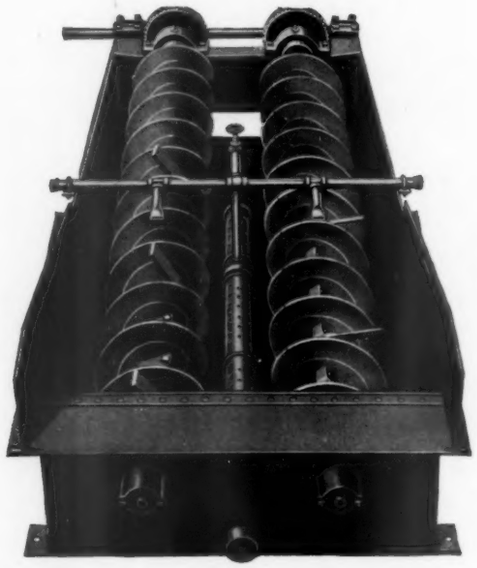
EAGLE "SWINTEK" SCREEN NOZZLE LADDERS

Will at least double your capacity in the hydraulic pumping of either sand, or of gravel, thru agitation and resultant constant even flow of material. In gravel winning the ladder will eliminate all stoppages by oversize material and deposit it out of the pumping zone. This simply means no pumping delays, just a steady run, 24 hours if you wish. Secure material orders when you have the chance by having the capacity to do it.

Whatever your washing problem there is an EAGLE that will solve it, either of the Spiral Screw, or Paddle Log Washer Type, with greater efficiency and less operating cost. Take advantage of our long experience as pioneers in this equipment for the Sand & Gravel Industry.

The more difficult the removal of the foreign material, the more reason you should investigate EAGLE Washers. Different sizes meet your capacity requirements, for washing either sand or gravel. The sand washers differ in that they are longer to give complete dewatering, with higher tub sides to give a deep settling basin. Features of design which can only be obtained in EAGLE machines, account for their installation in all sections of the country. If you require only de-watering we build a machine identical with the washer except that the up-currrent water feature is eliminated from the bottom of the tub. It is possible in this machine to float off light foreign material. Sand moisture content to, from 4 to 6%.

Double — Spiral Screw Type



EAGLE Products Include:

EAGLE Double Roll Crusher
EAGLE Shale Planer
Olson Self-dumping Cages
Specialized Mining Equipment
EAGLE Dry and Wet Pans
EAGLE Grinder

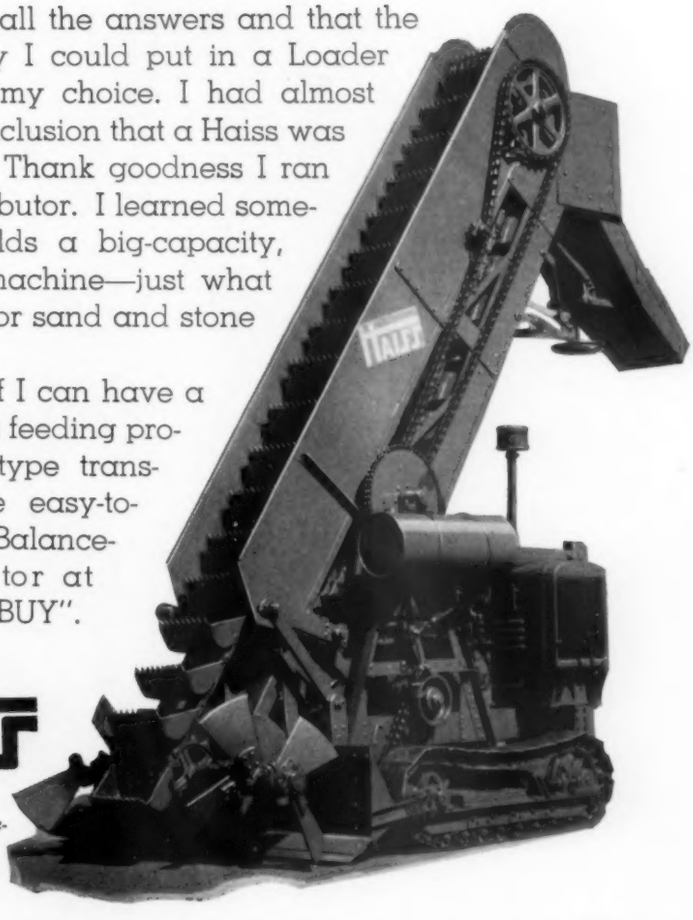
EAGLE IRON WORKS
DES MOINES - IOWA

I'VE JUST SEEN THE NEW HAISS "75"

THE HAISS HUSTLER OPENED MY EYES TO LOADER VALUE AT A PRICE . . .

I thought I knew all the answers and that the amount of money I could put in a Loader narrowed down my choice. I had almost jumped to the conclusion that a Haiss was out of my reach. Thank goodness I ran into a Haiss distributor. I learned something. Haiss builds a big-capacity, **popular priced** machine—just what a lot of us need for sand and stone work.

Let me tell you, if I can have a loader with Haiss feeding propellers, a Haiss-type transmission and the easy-to-operate Haiss Balance-pivoted Elevator at $3,350—that's a "BUY".



HAISS

Look over the machine pictured here, AND CLIP THE COUPON WHILE YOU'RE DOING IT.

THE BIGGEST 3 YARDS A MINUTE VALUE IN LOADERS

1. A Haiss-built machine with a HAISS quality reputation. That **means something** — as you'll learn by asking any man who has ever used Haiss equipment.
2. Haiss rugged, positive-action Self-feeding Device — still "tops" in work efficiency and clean-up effectiveness.
3. Balance-pivoted elevator with a worm-gear raising device your operator can twirl with **one** hand. The feather light touch that keeps clean-up under exact control.
4. **No** daily clutch take-ups. They and the gears are enclosed DUST TIGHT, and run in a bath of oil. Working hours are spent in loading instead of tinkering.
5. Waukesha power—4 cyl., 35 H.P.—free engine clutch and self-starter. Reliable power —and ready to GO.
6. 12,000 lbs. of solidly built Loader. CHECK that as value —real, husky strength that will take punishment without a whimper.

SEAMLESS FORGED BUCKETS—36,000 lb. STRENGTH ELEV. CHAINS — LONG, STRONG CREEPER TREADS and a factory price of only

$3350.00

GEORGE HAISS MFG. CO., INC.
142nd St. & Rider Ave., New York

Send me details on the "75" Loader and tell me where I can see one at work.

Name .....

Address .....

A New JACKHAMER-the JA-55

"A Big Brother to the Popular JA-45"

THE JA-55, a big brother to the JA-45 and JA-30 Jackhamers introduced during 1936, is now available for immediate delivery. It combines fast drilling speed, low upkeep cost, easy holding and low air consumption; the same outstanding features as the two smaller members of the JA family. Being heavier in construction, it is ideal for harder rock, deeper holes and for heavier jobs.

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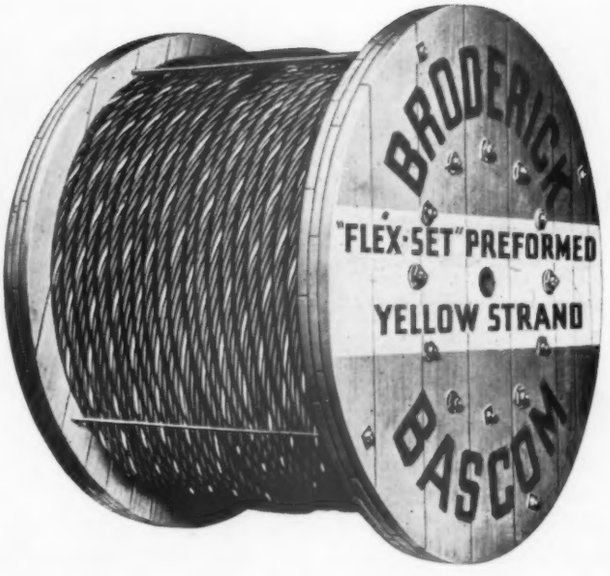
Check the Items that Meet Your Wire Rope Requirements

1. A limber rope—one that is easy to handle [ ]
2. A rope that is quickly installed [ ]
3. A rope that is largely "broken in" before you put it to work [ ]
4. A rope that may be used with comparatively small sheaves [ ]
5. A rope that is highly resistant to fatigue and kinking [ ]
6. A rope that spools evenly and runs smoothly [ ]
7. A rope that is quickly, easily, perfectly spliced and socketed [ ]
8. A rope that can be handled with more than ordinary safety [ ]
9. A rope that lasts exceptionally long [ ]
10. A rope that saves you money [ ]



How many did you check? If more than five—any five—the chances are that "Flex-Set" Preformed Yellow Strand is your best buy.

Preforming shapes the strands during manufacture to the helical form they will maintain in the rope—with the amazing results listed above. The original "well-balanced" properties of Yellow Strand are still there—plus the advantages gained by preforming.

Items 2 and 3 above are specially important on equipment whose ropes are renewed more or less frequently. "Flex-Set" Preformed Yellow Strand costs less to install; can be speeded up under full load in less time; lasts longer. Try "Flex-Set" Preformed Yellow Strand on power shovels, for hoist line, crowd rope, rack rope; on dragline machines, for dragline and hoist line; on clamshell buckets, for holding line and closing line.

Broderick & Bascom Rope Co.
ST. LOUIS

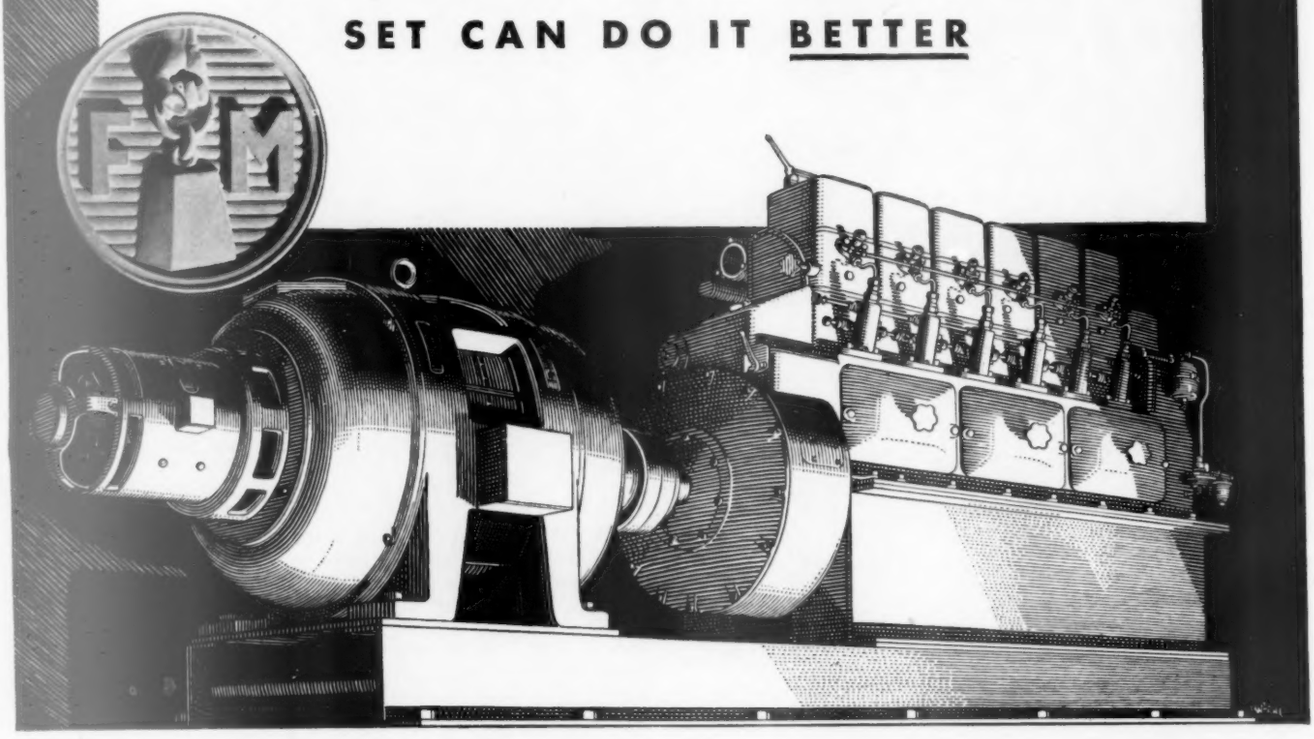
Factories: St. Louis—Seattle—Peoria
Branches: New York—Chicago—Seattle—Portland—Houston

No. U-7R2

"Flex-Set" Preformed Yellow Strand

GENERATING POWER?

THIS F-M DIESEL GENERATING SET CAN DO IT BETTER



WHEREVER you want power delivered—whether it is a few horsepower or a few hundred, don't think that the job is too small or too expensive for an F-M Model 36 Diesel-driven generating set to handle for you at a *profit*.

These sturdy Diesel generating sets put power *where* it's wanted, *when* it's wanted—whether you power a machine, a plant, or isolated equipment. Operating on low-priced fuels with an efficiency almost twice that of a gasoline engine for similar service, unbelievable economies can be obtained.

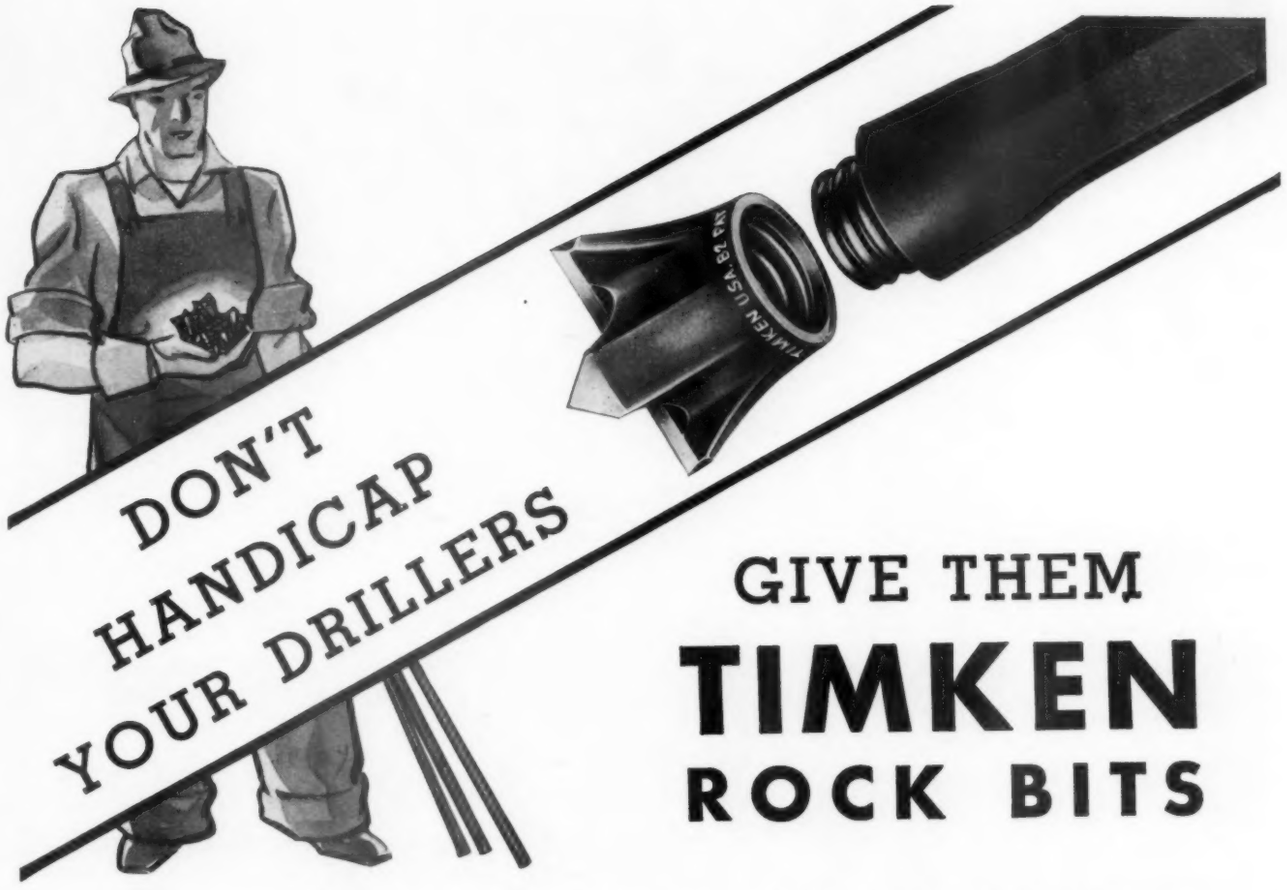
Before you decide on *any* power plant, see how much more F-M Diesels have to offer. For full information, write for a copy of Bulletin 1-811. Address Fairbanks, Morse & Co., 900 S. Wabash Avenue, Chicago, Ill. 34 branches at your service throughout the United States.

6910 OA–05.23

FAIRBANKS MORSE

POWER · PUMPING · AND WEIGHING EQUIPMENT

Diesels



GIVE THEM TIMKEN ROCK BITS

Give your drillers the faster penetration and longer life of TIMKEN Bits and they will give you more work for their day's pay—and without any greater effort.

There is no advantage in sticking to forged steel in the face of the *proved* economies of TIMKEN Bits. The longer you do so the more you will lose. Progress will not be denied, and nowhere is this fact more apparent than in the construction industry.

You wouldn't think of employing men with shovels to do all of your digging—or horse-drawn wagons to do your dirt hauling. And yet the contrast between the old and new methods of rock drilling is somewhat similar as regards efficiency.

In TIMKEN Bits the modern removable feature is seen at its best, plus the fast-drilling, wear-resisting qualities of deep-hardened TIMKEN Steel. You can't beat that combination. Write for further information and name of nearest distributor.

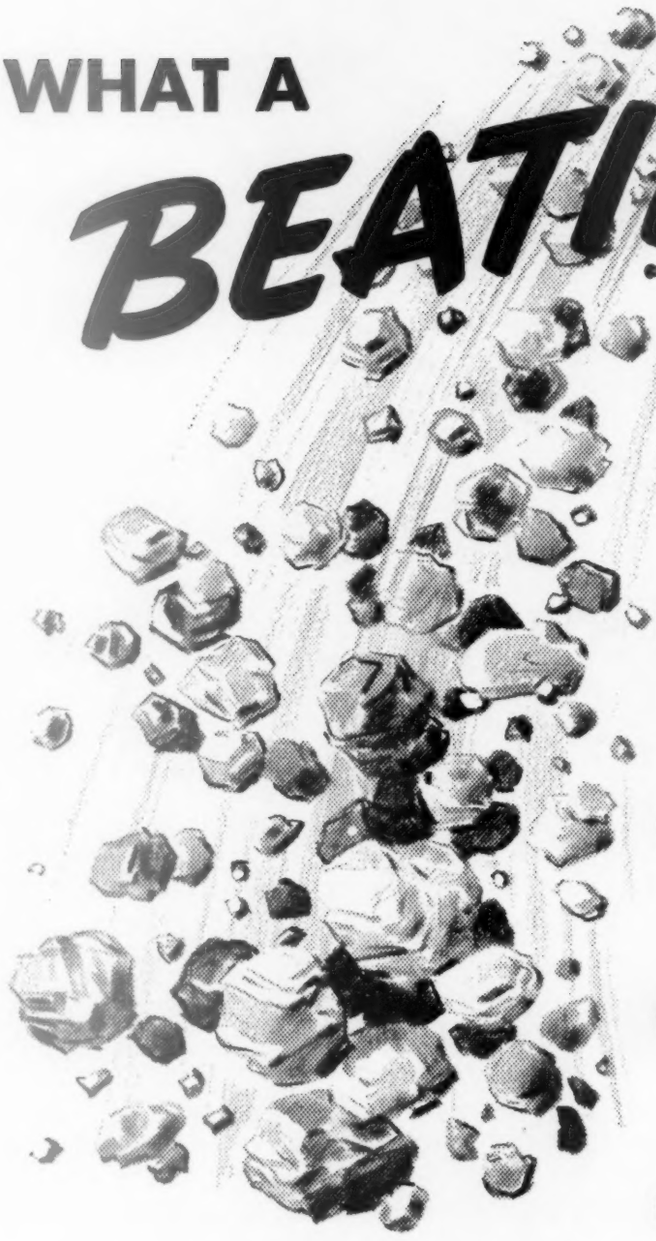
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

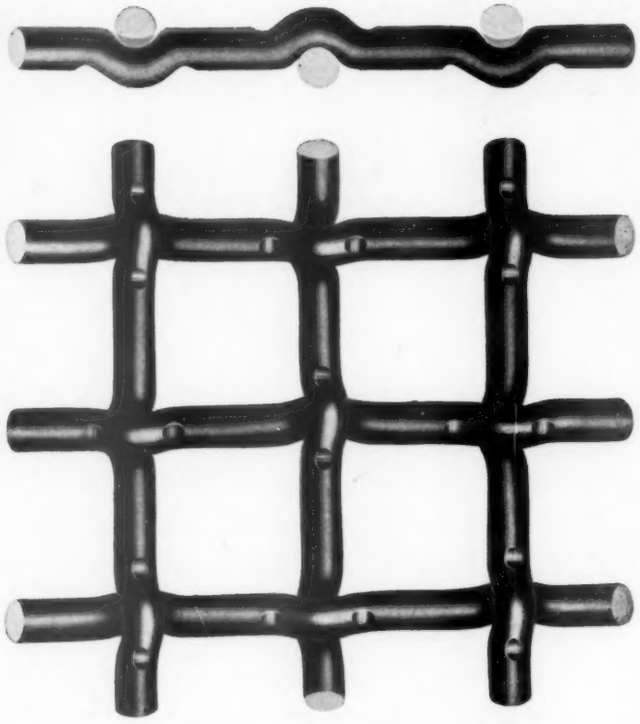
Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

TIMKEN
ROCK BITS

WHAT A BEATING!

HOW LONG DOES YOUR SCREENING STAND IT?





ABRASIVE TORRENTS of stone and gravel... constant vibration. Only screening with a maximum of toughness and stamina built into the wire itself can take this beating and give maximum life.

Making wire to withstand tough service conditions has been Roebling's business for over 90 years. If your screening problem is resistance to vibration and abrasion, let us put this long experience to work for you.

Roebling Wire Screening is made for every sizing, cleaning and grading service.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

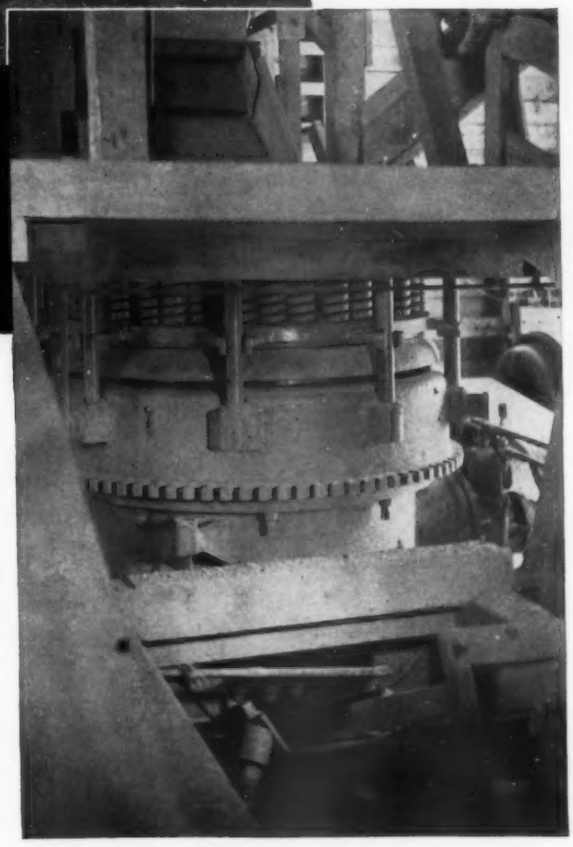
ROEBLING *Wire Screen*

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

In the custom mill of the Cripple Creek Mining and Milling Co. of Cripple Creek, Colorado, this 48 in. Telsmith Gyrasphere Crusher is in closed circuit with a vibrating screen, all ore being crushed to minus 3/8" before going to the roaster.

Crushing the Ore
FROM 30 MINES . . . . .



Like all other Telsmith Crushers, this 48-in. Telsmith Gyrasphere takes its rock as it finds it . . . hard, harder, or hardest . . . turns out a finer, more cubical product . . . and a lot more of it . . . in faster time . . . with less trouble, less power and less up-keep.

The Gyrasphere takes an unregulated and unlimited choke feed! Try to find another secondary crusher that can do it.

Like a mortar and pestle . . . only *inverted* for easy discharge . . . the spherical head and its corresponding concave catch and break the chunks of rock between two multi-curved surfaces—giving a perfect cubing action.

Double protectors . . . four flexible leather labyrinth seals plus two piston rings . . . cut oil and maintenance costs down as they've never been cut before.

All of which is interesting . . . *and* true. Bulletin Y-15 gives you the *whole* story . . . the way you like it. Just write us where to send it.

SMITH ENGINEERING WORKS
504 E. CAPITOL DRIVE
MILWAUKEE • WISCONSIN

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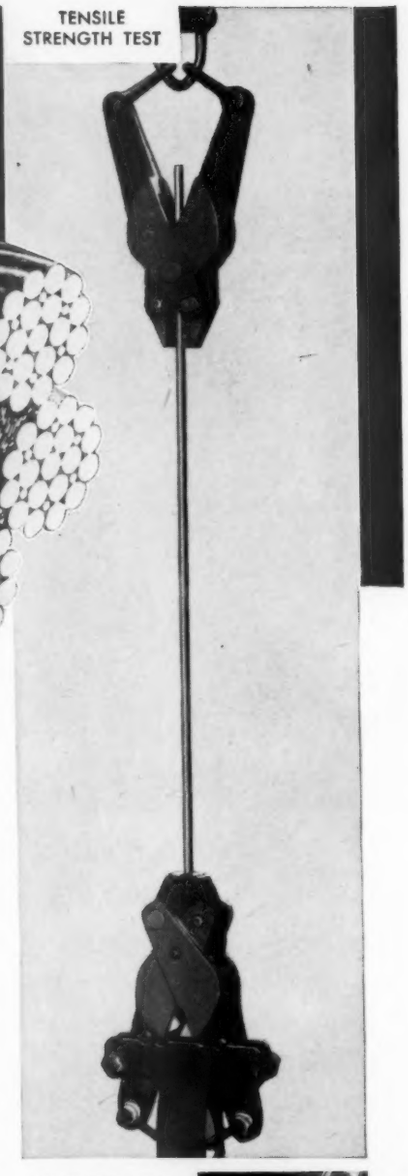
TELSMITH CRUSHERS

Y-10-B



WE TESTED THIS 450 TIMES

To prove its Quality

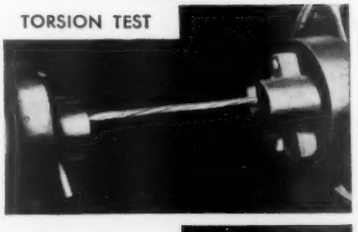
JUST as each part of a well built machine* must be tested individually before it is accepted, so each individual wire in American Tiger Brand Wire Rope is tested at least 3 times, in addition to test for size, before it can pass to the stranding machines.

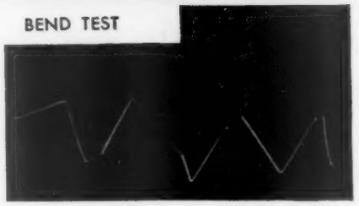
Your work puts wire rope to the severest tests. It must string or reeve easily and quickly . . . spool well . . . avoid whipping at high speeds . . . take the terrific jerks of starting and stopping.

And it is these qualities in American Tiger Brand Wire Rope which have given it a dominant position in the field—qualities which have been built into it by engineers whose wealth of experience is backed by over 100 years of wire making.

American Tiger Brand Wire Rope is available in either Standard (non-preformed) or Excellay (preformed) constructions.

***USS American Tiger Brand Wire Rope is a machine, more depended on than many. It fits the definition "Any combination of mechanism for utilizing or applying power."**





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American Tiger Brand Wire Rope. Electrical Wires & Cables. Amerclad All-Rubber Cables. Aerial Tramways. Tiger Wire Rope Slings. Tiger Wire Rope Clips.

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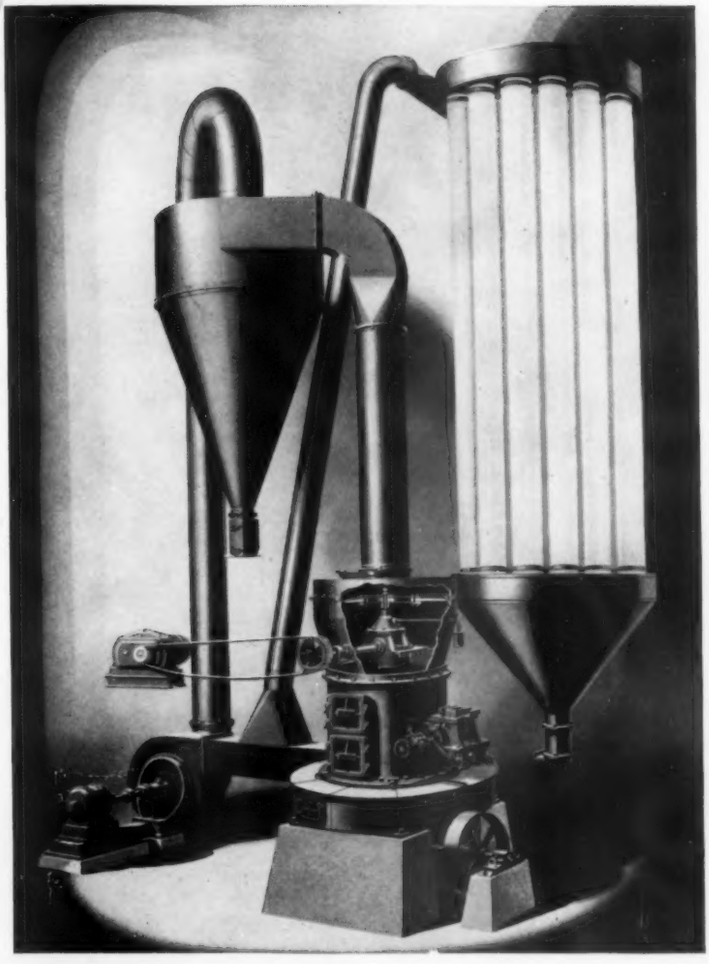

The new Whizzer-type Roller Mill has proved such a success that many plant operators are adding this patented feature to their old machines.

If your Raymond Roller Mill has given you long and faithfull service . . . and you cannot afford to replace it with a complete new unit . . . you can modernize it with a Whizzer Separator, and get results similar to the following:—

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THE GOODYEAR TIRE & RUBBER COMPANY, INC., AKRON, OHIO

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There's a GOODYEAR BATTERY now!

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TIRES FOR DUMP TRUCKS

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JUL -2 1937

PIT AND QUARRY

Vol. 29 June, 1937 No. 12

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Published on the tenth of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other nonmetallic minerals. Copyrighted 1937 by Complete Service Publishing Co., 538 South Clark Street, Chicago, Ill.

H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Circulation Manager:
W. T. KLUSSMAN

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

Eastern Advertising Manager:
W. A. BUSCHMAN
Room 420, 122 East 42nd St.
Telephone CALedonia 5-4438
New York, N. Y.

Central Advertising Manager:
W. H. SANDERSON
Auditorium Bldg.
Telephone CHerry 6339
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PIT AND QUARRY

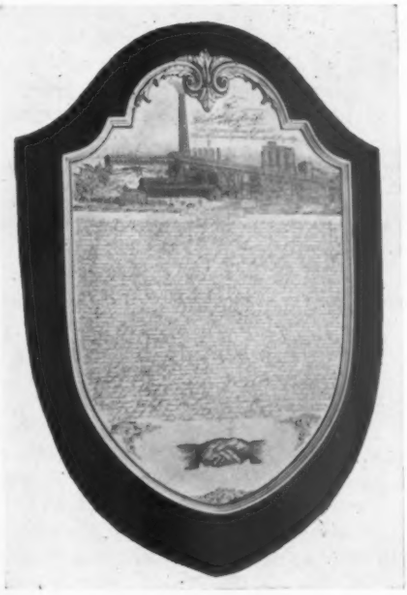
CHICAGO JUNE, 1937

Plant Workers Honor George Moyle, Sr.

409 NAMES ON SILVER PLAQUE

Evidence of the high regard in which "his boys" hold him is the beautiful silver plaque which 409 employees of the Cape Girardeau plant of the Marquette Cement Mfg. Co., have presented Richard Moyle, Sr. of Oglesby, Marquette's "grand old man" and its vice-president in charge of operations.

The presentation of this tribute to Mr. Moyle, entirely unexpected by the recipient, was made by the Cape Girardeau force when he visited the plant there recently on a routine inspection trip and so touched was he by the fond sentiments thus conveyed by the employees that tears came to his eyes and it was with difficulty that he responded.



Plaque presented Mr. Moyle by employees at Cape Girardeau.

The silver tablet, captioned "To Richard Moyle, Sr. in Appreciation of Your True Friendship and Constant Loyalty," bears the engraved signature of every employee of the Missouri industry in his own handwriting and the fund to purchase it was raised by voluntary subscriptions throughout the large plant.

Mr. Moyle acquired his concern for the workingman's welfare through toil with his own hands in the copper mines of Michigan, in the coal mines of Oglesby, as a stable boy in New York for a time after he came to these shores from England, as a tracklayer with a Burlington Railroad "section" gang, as a laborer in the early days of Oglesby's cement industry. That concern he has exercised throughout the years he has dealt with men and that they appreciate it and value it is reflected in what occurred at Cape Girardeau last month.

Los Angeles Producers Contemplate Merger

Merging of assets of the Consolidated Rock Products Co. of Los Angeles, Cal., and its subsidiaries, the Union Rock Co. and the Consumers Rock & Gravel Co., is contemplated in a reorganization plan filed in federal court at Los Angeles. The three companies have been operated jointly since May, 24, 1935, under Section 77-B of the National Bankruptcy Act.

Formation of a new corporation is proposed to be known as Consolidated Rock Co.

Fire Destroys Indiana Crushed Stone Plant

Fire of undetermined origin recently destroyed the plant of the Bloomington Crushed Stone Co., near Bloomington, Ind., causing a loss of about $75,000, partially covered by insurance. Ralph Rogers owns the concern.

E. J. Mehren Leaves Portland Cement Assn.

SUCCESSOR NOT YET ELECTED

The resignation of Edward J. Mehren, as president of the Portland Cement Assn. was announced May 25 at the association's general offices in Chicago. Mr. Mehren's resignation came, it was stated, because of his desire to

Edward J. Mehren.

devote his entire time to personal interests in Arizona and in the east.

Mr. Mehren was elected in 1931 as the first full-time, paid president of the Portland Cement Assn. which was organized in 1902.

Mr. Mehren is a member of the executive committee of the National Safety Council and of the policy committee of the Construction League of the United States. He was formly vice-president of the McGraw-Hill Publishing Co. The resignation will take effect Aug. 31. His successor has not yet been elected.

★ The Blue Valley Sand & Gravel Co., Fairbury, Neb., has purchased an 8-in. heavy-duty "Lightning" dredge pump from the Kansas City Hay Press Co., Kansas City, Mo.

Residential Building in April Exceeds 1930

61 PER CENT. OVER APRIL, 1936

Not since May, 1930 has residential building been undertaken in such heavy volume as was reported in April of this year. According to F. W. Dodge Corp., the value of residential building operations started during April in the 37 states east of the Rocky Mountains amounted to $108,204,400, marking a gain of 20 per cent. over the March figure of $90,167,600 and an increase of 61 per cent. over the total of $67,151,000 reported in the same area during April, 1936. The improvement over last April was generally shared by each of the 13 reporting geographic districts; the most important quantitative gains occurred in the metropolitan area of New York and the middle-Atlantic states (Eastern Pennsylvania, Southern New Jersey, Delaware, Maryland, the District of Columbia and Virginia).

For the initial four months of 1937 the total volume of residential building started in the 37 eastern states amounted to $339,782,400; this represented an increase of 78 per cent. over the figure of $190,986,600 for the corresponding four months of 1936.

Total construction started in the 37 states during April (inclusive of both residential and all other types) amounted to $270,125,200. This was a gain of about 17 per cent. over the March figure and was about 16 per cent. better than the figure for April 1936. Incidentally, the April, 1937 total was the biggest monthly figure since that recorded for August, 1936. Besides residential building, the April, 1937 figure included $96,179,300 for non-residential building and $65,741,500 for heavy civil engineering projects, i. e., public works and public utilities.

Total construction started in the 37 eastern states since January 1, has amounted to $932,455,400. This represents an increase of 18 per cent. over the figure of $788,605,400 reported during the initial four months of 1936.

A new Marion shovel recently went into service at the quarry of Union Quarries Co. at Van Wert, O. This view shows the machine loading cars in the quarry.

Slide in Pennsylvania Quarry Kills Two Men

Two quarry workers were killed May 12 in a slide in the Pemberton quarry of the American Lime & Stone Co., near Tyrone, Pa. The victims were William Sheppard, 28, and Joseph Seiner, 26.

A crew of about 25 men worked for more than two hours before the bodies of the victims were recovered.

New Asphalt and Stone Plants Built in East

More than $60,000 has been expended by the Cushing Stone Co., Schenectady, N. Y., in the erection of a crushing plant and aggregate-bituminizing equipment near Easy Branch, N. Y. The new operation will serve a number of important road and bridge projects scheduled for construction in that area.

Asphalt Institute to Convene in Memphis

After spirited bidding from Los Angeles, Cleveland, New Orleans and Memphis, the Board of Directors of the Asphalt Institute have decided to hold the 1937 National Asphalt Conference in Memphis during the week of December 6. The conference will serve as clearing house for information on the most efficient methods of road-building, soil stabilization, flood-control, harbor protection, airport surfacing and of building safety into and alongside of highways.

Build Plant to Produce Pre-Cast Concrete Slabs

Construction is nearing completion on a $35,000 plant for the production of pre-cast reinforced-concrete slabs by the Geiger Engineering & Mfg. Co., Irvington, N. J. The slabs as manufactured will be used to fabricate the sidewalls of standard industrial buildings and will be sold and used in the New York area.

Arthur S. Lane Retires From Active Duties

SUCCEEDED BY WALTER A. CAREY

After 46 years of service with John S. Lane & Son, Inc., Meriden, Conn., producer of crushed trap-rock and its road-building subsidiary, the Lane Construction Co., Arthur S. Lane, treasurer of the companies retired from active duty on May 1. He has been succeeded by Walter A. Carey who has been associated with the Lane companies for the last 17 years. Mr. Lane will continue to serve as vice-president.

The business was founded by Mr. Lane's father, John S. Lane in 1890. Five trap-rock plants are operated.

Georgia Stone Producer Makes Many Changes

★ The Stockbridge Stone Co. recently completed a number of improvements to its plant at Stockbridge, Ga. A 36-in. by 48-in. Farrel-Bacon jaw crusher replaced a smaller unit and a 4-ft. Symons cone crusher with a coarse bowl replaced two gyratory crushers. Other improvements included the extension of a belt conveyor and the use of an electric shovel in the quarry, the latter having been brought from another plant. Last year truck haulage was adopted in the quarry, Mack trucks being used.

Gravel Pit Accidents Arouse Ontario Govt.

Owing to several fatal accidents having occurred throughout Ontario during the past few months, as the result of gravel pits having caved in on employees, the Ontario government is giving wide publicity to the law covering removal of gravel from pits.

Firms and individuals who evade the law, which stipulates that the only proper way is the terracing or sloping of the pits, will be subject to court action in the case of accident.

L. G. Everist, Inc., Opens South Dakota Office

A branch office of L. G. Everist, Inc., of Sioux City, Ia., has been established at Sioux Falls, S. D., at 210 Paulton Block, under the management of P. O. Pederson, to handle the sale of materials from the quarries of the company at Dell Rapids, S. D., and from its sand-and-gravel plants at Hawarden, Ia., and Klondike, Ia.

Ash Grove's Lime Plant Wins Safety Contest

ACCIDENT-FREQUENCY RATEDOWN

During the calendar year 1936 the United States Bureau of Mines conducted, for the second time, a safety contest among lime plants in co-operation with the National Lime Assn. The contest revealed a slightly better accident-frequency rate than that shown in the previous year, although the severity rate was not as good as the corresponding rate in 1935.

In competition were 28 plants operating in 12 states, and the contest covered all lost-time accidents and the total number of man-hours worked by the employees of the plants enrolled. All work at the plants was included, from the quarrying of the limestone to the manufacturing of the finished lime prepared for the market.

As a recognition of successful efforts in promoting safety, certificates of honor were awarded to the eight companies whose plants were operated without a lost-time accident during the contest year.

The relative standing of the various plants is determined according to the accident-severity rates, that is, according to the total number of days of disability of the employees on account of accidents in proportion to the number of man-hours of work performed by all of the employees at the plant.

Reports of accidents and of man-hours worked were furnished to the U. S. Bureau of Mines by the companies. These reports were analyzed and classified to insure uniform weighting of accidents according to the number of days of disability to be charged and to insure uniformity of methods of calculating the accident-severity rates for the various plants.

Plants awarded certificates included the following:

Galloway, Mo. plant, operated by the Ash Grove Lime & Portland Cement Co. (240,920 man-hours).

Martinsburg, W. Va. plant, operated by the North American Cement Corp. (203,322 man-hours).

Hannibal, Mo. plant, operated by the Marblehead Lime Co. (183,469 man-hours).

Thomasville, Pa. plant, operated by the J. E. Baker Co. (114,440 man-hours).

Reddick, Fla. plant, operated by the Dixie Lime Products Co. (110,213 man-hours).

Springfield, Mo. plant, operated by the Marblehead Lime Co. (103,752 man-hours).

Quincy, Ill. plant, operated by the Marblehead Lime Co. (91,315 man-hours).

Kimbalton, Va. plant, operated by the Kimbalton Lime Co. (86,422 man-hours).

The 1936 contest covered 5,315,917 man-hours and during this time there were 112 lost-time accidents, of which two were fatal; three were permanent-partial injuries and 107 were of a temporary nature. The plants which suffered lost-time accidents had from one to ten accidents per plant, with the exception of two plants, one of which had 15 lost-time accidents and the other 13. It is interesting to note that four plants had only one accident each during the contest.

The 12 states that were represented in the contest of 1936 were: Alabama; Florida; Illinois; Indiana; Maine; Maryland; Missouri; Ohio; Pennsylvania; Tennessee; Virginia and West Virginia.

Twenty-five of the 28 plants that were enrolled in the safety contest of 1936 had better severity rates than the average rate of all of the plants, and 17 plants had frequency rates better than the average for the group. Two plants suffered more than 65 per cent. of all of the days lost caused by the 112 injuries.

The contest for 1935 covered only the last six months of the year; that for 1936 covered the entire year. In the comparison of these identical plants for both years the frequency of accidents decreased by 3½ per cent. but the severity increased by 6 per cent. This increased severity is due to the fact that there were two fatal accidents during 1936, each with a charge of 6,000 hours lost, whereas no fatal accidents occurred during the last six months of 1935.

Flood Damage Increases Demand for Aggregates

Gravel fleets along the lower Ohio, Wabash and White rivers have been extremely busy since early spring. The flood along the Ohio river in January and February last caused severe losses and much building and repair work has been going forward for several months past. The demand for sand and gravel is expected to be strong the remainder of the year.

★ A McLanahan log-washer has been installed in the Havre de Grace, Md., trap-rock plant of the Standard Lime & Stone Co.

Herzog Lime & Stone Expands Operations

ADDS GROUND STONE EQUIPMENT

Construction has been completed on a $60,000 addition to the plant of the Herzog Lime & Stone Co. at Forest, O. The new structure is 45 ft. by 50 ft. in size and is of steel and concrete construction. Drying and pulverizing equipment were installed to enable the production of fine materials including stone sand, asphalt filler and agricultural lime.

Burial Vault Makers Adopt Fair Trade Code

The Concrete Burial Vault Manufacturers' Assn., has announced that members of the industry have adopted a code of fair-trade practices after a conference with the Federal Trade Commission, according to Ralph W. Meade of Cleveland, secretary.

The conference was called to afford the industry an opportunity voluntarily to eliminate certain trade practices believed to be unfair and harmful to the industry and the public.

Among the practices discussed in the conference were commercial bribery, disparaging of competitors' products, trade-mark imitations, false or deceptive marking of products, misrepresentation and inducing breach of contract.

Sand and Gravel Directors Will Meet in Buffalo

The board of directors of the National Sand & Gravel Assn. will hold its semi-annual meeting at the Statler Hotel, Buffalo, N. Y., on June 24 and 25.

A view of the Luckey, O., lime plant of the National Gypsum Co. showing the four new shaft kilns which recently went into operation.

Eastern Producer Christens New Boat

SECOND SUCH EVENT THIS YEAR

The Metropolitan Sand & Gravel Co., of New York City on May 8 christened a new tug-boat, the *W. A. Atkins,* named after one of the company's officials. The new craft, more than 100 ft. long, is the second vessel of its type to go into service this year, the *Rocco* having been launched in March. The additions increase the fleet of tug-boats of the company to 12. They are used to pull barges laden with gravel from the company's pits at Port Washington on Long Island to the distributing yards on the New York waterfront.

Asbestos Corp. Plans To Redeem All Bonds

Asbestos Corporation, Ltd., of Montreal has announced plans for the redemption of all existing bonds, issuance of $1,000,000 of new five-year 4 per cent. serial bonds, and sale of 17,288 additional shares of common stock. The latter will be offered to shareholders at $75 a share at the rate of one share for every eight shares held.

The company now has outstanding $300,000 first mortgage 3- and 3½-per cent. bonds and $2,299,000 general mortgage 6 per cent. income bonds, due Jan. 1, 1941. The latter have been called for redemption at par July 1.

Ohio River Shipment Of Nonmetals Increases

The volume of river freight shipment through Evansville, Ind., in 1936 showed a substantial gain over the previous year, according to figures compiled by the United States district enginer's office in Louisville, Ky. Inbound freight increased 75,000 tons and outbound freight increased 15,000 tons. The increase in movements of some of the commodities was: sand and gravel, 22 per cent.; cement, 16 per cent.; fluorspar, 75 per cent. Since river and rail terminals were erected at Evansville a few years ago shipments on the Ohio River have increased year after year.

The American Stone Corp., Lima, O., uses motor trucks equipped with Gar Wood dump bodies for making shipments and for quarry service. The company only recently purchased five additional trucks, all equipped with Gar Wood bodies.

Michigan Stone Plants Visited by Students

More than 40 geologists and students participated in the annual field excursion of the geological section, Academy of Science of the University of Michigan during the four days, May 28-31. Included in the operations visited were those of the Michigan Limestone & Chemical Co., the Kelley Island Lime & Transport Co., the Michigan Alkali Co., and the Thunder Bay Quarries Co. near the western shore of Lake Huron.

Missouri Gravel Concern Equips Dolomite Quarry

The Independent Gravel Co., of Joplin, Mo., is developing a deposit of dolomite located a mile north of Sulphur Springs, Ark., and a crusher has been established at that point. The quarry was opened about a year ago, and dolomite was shipped to the company's crusher at Carthage, Mo. The deposit averages about 4 ft. deep, under 12 ft. of overburden.

$75,000 Flood Damage In Canadian Quarry

The serious flood which visited Western Ontario recently caused damage and trouble for various quarries in the area west of Woodstock. The bursting of a mill dam on Cedar Creek just south of Woodstock so increased the abnormal flow in the Thames River near the quarry of Gypsum, Lime & Alabastine Co. of Canada, that the protective dikes were washed away and the quarry filled with water. Damage amounted to about $75,000. The Innerkip Limestone Co., in the same area, also suffered loss from the flood.

★ The Roy T. Hoke Lumber Co. of Stillwater, Okla., has gone into the ready-mixed-concrete business. Activity in the oil fields near the city has so stimulated building that the company decided to enter the industry.

Industrial Sand Group Holds Annual Meeting

SILICOSIS RECEIVES ATTENTION

Members of the National Industrial Sand Assn. attended the second annual convention of the organization in Washington, D. C. on May 18 and 19. All sessions were held in the Raleigh Hotel.

The morning of the first day was given over to the meeting of the board of directors. In the afternoon Stanton Walker, director of engineering, pointed out the need and benefits to be gained from a well-planned program of research. Pending and proposed legislation was discussed by V. P. Ahearn in his talk entitled "The Political Scene in Washington." The proposal of the railroads for increased rates on industrial sands was also discussed in considerable detail.

Wednesday morning, May 19, was given over to the silicosis problem, a general discussion following the presentation of four papers. The speakers were Dr. A. J. Lanza, New York, N. Y.; Warren A. Cook, Hartford, Conn.; Theodore C. Waters, Baltimore, Md.; and H. B. Meller, Pittsburgh, Pa. All are authorities on the subject and handled their particular phase of the problem in a clear, understanding manner.

The afternoon was given over to a round-table discussion on current labor questions.

Officers and the board of directors were re-elected for another year. A. Warsaw, Chicago, Ill., is president; R. G. Hay, Zanesville, O., vice-president; and L. M. Hansen, Chicago, Ill., treasurer.

Concrete Producer Adds 300-Ton Aggregate Bin

Installation of a 300-ton sand and gravel hopper at the Crescent Supply Co., ready-mixed concrete plant at Evansville, Ind., has been completed. Steady increase in busines and the growing popularity of ready-mixed concrete among the contractors has also necessitated the addition of three more trucks to the company's fleet.

The new hopper, which is four times as large as the former one, has a capacity of aggregate sufficient for 100 cu. yd. of concrete.

★ The Hawkeye Gypsum Co., Ft. Dodge, Ia., has installed a single-roll McLanahan crusher for primary breaking.

Large Concerns Improve Financial Condition

ONLY ONE OF TEN SHOWS LOSS

The accompanying table lists ten representative cement, gypsum and aggregate producers for which earnings figures for the years 1936 and 1935 are available. Two companies which showed a loss in 1935 are in the profit column for 1936, while one concern still showed a loss in 1936, considerably smaller, however, than in the preceding year.

The total improvement in earnings for the ten companies was $8,229,469.

Company	Net Profit 1936	Net Profit 1935
Alpha Portland Cement Co.	$ 862,125	*$ 180,162
Arundel Corp.	631,216	597,625
Coplay Cement Mfg. Co.	44,047	*12,660
Lehigh Portland Cement Co.	2,160,670	495,961
Lone Star Cement Corp.	2,829,464	1,048,443
National Gypsum Co.	1,018,655	532,462
Pennsylvania-Dixie Cement Corp.	*249,569	*796,880
Riverside Cement Co.	906,595	193,890
U. S. Gypsum Co.	5,328,113	3,491,252
Yosemite Portland Cement Co	128,749	60,455

* Loss.

Suggest Tolerance for Sand-Lime Brick Size

The standing committee in charge of simplified practice recommendation R38, Sand-Lime Brick, has approved a revision of the recommendation, and the Division of Simplified Practice of the National Bureau of Standards has mailed copies to all interests for consideration and approval.

The original recommendation, which became effective July 1, 1925, provides for one standard size of sand-lime brick, having a length of 8 in., width of 3¾ in., and thickness of 2¼ in. The recommendation was reaffirmed without change in 1926, 1928, and 1933.

The current revision provides for the addition of a tolerance of ¼ in. on length, and ⅛ in. on thickness and width, without any change in the standard size. The revised schedule, when adopted by those at interest, will remain in effect until it is again revised by the standing committee of the industry.

New York Concern Sells One of Its Properties

Eastern Rock Products, Inc., with main offices at Utica, N. Y., has disposed of its holdings at Chenango Bridge, N. Y., which will be taken over by the Binghamton Crushed Stone & Gravel Corp. Equipment is being taken down and transferred to the company's Oriskany Falls and Utica plants. The Utica concern operates six plants within the state.

In acquiring the Chenango Bridge properties, the Binghamton concern will have a daily capacity of 15,000 tons. It has two other plants in operation in the Binghamton area.

Attack Provisions of Social Security Act

The Alpha Portland Cement Co. and 203 other individuals and corporations have filed with the United States Supreme Court an attack on the constitutionality of provisions of the social security act taxing employers for the aid of the unemployed.

175 Workers in Ohio Plant Out on Strike

The Port Clinton, O., plant of the American Gypsum Co. was closed on May 21 when union employees went on strike over the reported refusal of the firm to re-hire a former workman. About 175 men were affected by the walkout.

Producer Ballot Favors Truck Mixer Standards

Eighty-five per cent. of the returns on the letter ballot submitted to members of the National Ready Mixed Concrete Assn. on the tentative standards and recommended practices for truck mixers and agitators of the revolving-drum type have favored the standards as proposed and they have been unanimously approved by the executive committee, according to Stanton Walker, director of engineering.

National Gypsum Co. To Issue No-Par Stock

Stockholders of the National Gypsum Co. have authorized 100,000 shares of no-par cumulative preferred stock, issuable in series.

It is proposed to issue the first series of 80,000 shares, carrying $4.50 annual dividends, in the near future, to be followed by the retirement of the company's preferred stock. There will also be redeemed $747,000 of 6 per cent. sinking fund bonds and a $1,250,000 4 per cent. plant-mortgage note.

U. S. Bureau of Mines Makes Cement Studies

PAPER TO BE PUBLISHED SOON

A study of the factors involved in the retardation in the rate of setting of Portland cement is important both to cement manufacturers and to those interested in gypsum or anhydrite. Recently, a long research on the possibility of substituting anhydrite ($CaSO_4$) for gypsum ($CaSO_4.2H_2O$) in the retarding of set of Portland cement has been completed by the U. S. Bureau of Mines. A certain permissible substitution was found and the results will be forthcoming in a technical paper to be published by the Bureau within a few months.

One important byproduct of this work was the discovery that the water vapor distilling out of the gypsum has an important effect. Omitting gypsum entirely and substituting steam seasoning at temperatures common to clinker-grinding ball mills (in the range 105°-120° C.) the resulting ground cement is actually improved in many of its properties.

Perfect control over the rate of set can be obtained through a function of the temperature of seasoning by regulation of the amount of water vapor absorbed. The higher the temperature, the less water vapor the cement can take up. Cements have always been steam-seasoned unwittingly in the past and under imperfectly designed conditions, due to the water content of gypsum. Therefore, this work has added an important new element of control over properties of Portland cements. In addition, it is said to make possible a clinker ground to a finer degree, with a resulting cement of higher strength.

The Maumee Asphalt Paving Co., of Toledo has just erected this new aggregate-bituminizing plant at Middle Point, O. Its capacity is 500 tons per day. Much of the equipment, including a rotary drier, was supplied by Hetherington & Berner, Inc., Indianapolis, Ind.

NATATORIUM FOR MILL WORKERS

Construction has started on the natatorium pictured above for employees of the Marquette Cement Mfg. Co. at Cape Girardeau, Mo. It is the gift of W. Woodbridge Dickinson, a director and first vice-president of the company as a memorial to his father, the late William Dickinson, one of the founders of the company. The pool and structure will be entirely of concrete. Locker and shower rooms are included.

Two Workers Killed in Canadian Mine Accident

F. A. Robinson, 39, was killed instantly and his companion, John Grinyer, 43, died later from injuries received when a part of the mine of the Gypsum, Lime & Alabastine Co. of Canada, Ltd., at Caledonia, Ont., caved in. The men were working underground, drilling and scaling down rock from the roof of the mine, when it gave way.

Kentucky Rock Asphalt Extends Quarry Trackage

Expansion of the railroad facilities at the Edmondson County quarries of the Kentucky Rock Asphalt Co. is going forward and 4 mi. of new track is expected to be completed by June 1.

The extension will give the company 10 or 12 mi. of trackage in the quarrying area. Twenty-two locomotives operate over these lines in hauling the quarried material to the crushing and processing plant.

Mines Bureau Studies Limestone Characteristics

The characteristics of the limestone from which mortar is made have an important bearing on the manner of hydration. The plasticity of the resulting mortar is highly important, yet little is known about the factors that make for desirable characteristics. A study of changing composition of the limestone as it affects the hydration of lime is now in progress by the U. S. Bureau of Mines and a report is expected to be published later on this year.

Physical tests on plasticity, rates of setting, and putty volume are being considered with special attention to temperature. The results, to date, show that plasticity is very decidedly a factor of slaking temperature, and this temperature depends upon the magnesia content of the original limestone. For example, dolomitic (magnesia) limes are improved in most cases by decreasing the free magnesia present.

Concrete Pipe Plant Planned for Memphis

★ The Mid-South Concrete Pipe Co. is spending $5,000 for a building and $20,000 for equipment at a new pipe plant at 1977 Chelsea St. in Memphis, Tenn.

This is the first of several plants planned for the south by the company. R. S. Monday, former head of the Sherman Concrete Pipe Co., Knoxville, Tenn., is president of the concern.

Will Rebuild Plant Destroyed by Fire

The plant of the A.J. Snyder Lime & Stone Co. near Kingston, N. Y. was destroyed by fire on the afternoon of May 11. The loss was estimated at $50,000 and was partially covered by insurance. The operations will be rebuilt, it is reported.

Lone Star, Texas, Plans New Silos & Packhouse

WILL NEARLY DOUBLE STORAGE

Contracts have been awarded to the Nicholson Co. of New York for the construction of four concrete storage silos and a pack house for the Lone Star Cement Corp., Houston, Tex., plant.

The work is expected to cost around $125,000. The silos will be 80 ft. high and 32 ft. in diameter. The pack house will be of concrete and 75 ft. by 30 ft., and 90 ft. high.

After the work is completed the plant's storage capacity will have been increased 65 per cent., according to L. R. Ferguson, vice-president.

Basing Point Price System May Face New Attack

The entire subject of basing points, delivered prices, and freight absorption may be brought up again inasmuch as the Federal Trade Commission recently issued a citation against the Cast Iron Soil Pipe Assn. and 35 member companies alleging lessened price competition and price discrimination through the use of a "Birmingham-plus" base. It will be recalled that Senator Wheeler a year ago held hearings upon an anti-basing point bill but the proposal has not been active so far this session of Congress.

Louisville Cement Co. Fights I. C. C. Ruling

The Louisville Cement Co., Louisville, Ky., has filed suit in Federal court asking an injunction to prevent the Interstate Commerce Commission from enforcing an order banning allowances by the Pennsylvania Railroad to the cement company for car-spotting and switching services performed by the company at its Speed, Ind., cement plant.

Allowances are said to average about $700 monthly.

Peerless Cement Corp. Opens Port Huron Plant

The Port Huron, Mich., plant of the Peerless Cement Corp. resumed operations May 1 after having been closed since 1932. A small force of men has been at work since the first of the year reconditioning the plant and equipment preparatory to re-opening. About 125 men went back to work when operations started again.

Alabama Cement Firms Protest State Sales Tax

UNFAIR COMPETITION FEARED

Cement manufacturers in the Birmingham, Ala., district have filed a joint bill in the Montgomery County Circuit Court against the Alabama Tax Commission, asking a declaratory judgment exempting carload lots of their product from the 2-per cent. state sales tax. The petitioners contended that cement is not a finished product and when sold in carload lots, is exempt from the tax. They also averred that to tax them would bring about a condition of unfair competition with similar industries in other states.

Former Ohio Quarry to Be Made Into a Park

Abandoned quarry properties at Berea, O., owned by the Cleveland Quarries Co. has been sold to the Cleveland Metropolitan Park Board. The area, about 164 acres in extent, was purchased for $19,571 and will be converted to park purposes and a broad program of improvements is being scheduled with the work to be done by the W. P. A.

Oregon Producer Improves Newly Acquired Plant

The Eugene Sand & Gravel Co., Eugene, Ore., has acquired the Independence Sand & Gravel Co., Independence, Ore. About $6,000 is being spent for the erection of new storage facilities and other improvements.

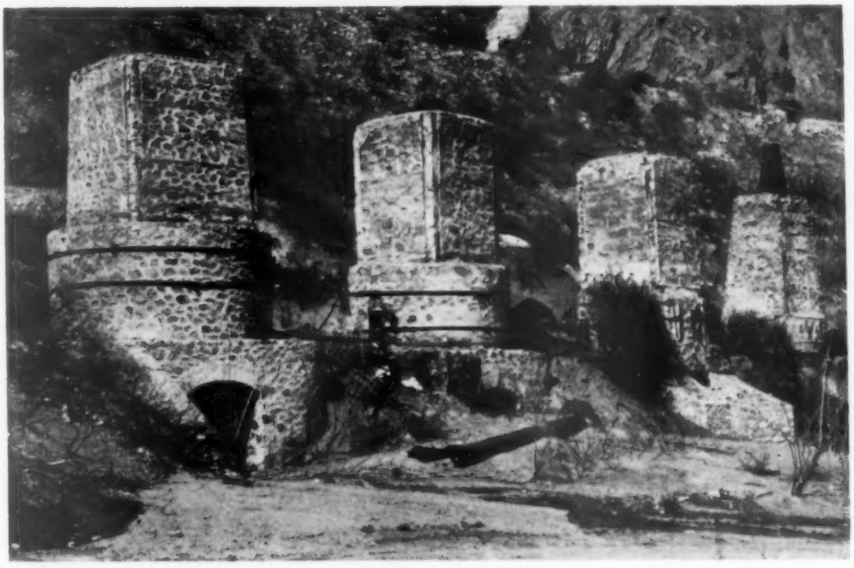
Lone Star Cement Corp. Shows Larger Profit

Report of the Lone Star Cement Corp. (formerly International Cement Corp.) for the quarter ended March 31, 1937, shows net profit of $735,704, equal to 76c a share on 967,070 shares outstanding. No provision was made for surtax on undistributed profits.

This compares with $468,304 or 71c a share on 656,740 shares in the March quarter of 1936.

The McGrath Sand & Gravel Co., Lincoln, Ill., and the Missouri Gravel Co., LaGrange, Mo., have been awarded contracts for 22,364 tons of material to be used on paving projects in Morgan County, Illinois this summer.

OLD CALIFORNIA LIME KILNS



Staunch reminders of an earlier day in the lime industry are these four shaft kilns which stand in the Cienega District of San Benito County, south of Hollister, Cal. Operations began in 1888, stone being supplied from the mountain quarry in the background. Wood was used for fuel and coopers made lime barrels on the site. Finished lime was hauled in wagons by oxen to the nearest railroad for shipment to cities on the coast. The kilns were in constant use for seven years when Henry Cowell, founder of the Henry Cowell Lime & Cement Co., San Francisco, Cal., purchased the business for $10,000 and transferred operations to the company's present lime plant at Rincon, near Santa Cruz, Cal.

Coulee Dam Gravel Plant Capacity Increased

Addition of new equipment has increased the capacity of the sand-and-gravel plant at Grand Coulee Dam. The additions were made necessary because of the fact that concrete production is being stepped up to 400,000 cu. yd. monthly.

Better Paper Bags Reduce Extras Needed

Most lime manufacturers are familiar with the general and recommended practice of placing some extra bags in a car shipment of lime to take care of any breakage in shipment.

Because of the increased serviceability of bags during recent years, however, the number of extras inclosed per car has been sharply reduced. From five to twenty extra containers per car now is considered ample.

Montana Gypsum Plant Damaged by Fire

Fire caused considerable damage at the Heath, Mont., plaster plant of the United States Gypsum Co. a few weeks ago.

Officials of the company visited the scene of the blaze shortly afterward and are reported to be preparing to rebuild.

Ten-Year Safety Record Celebrated With Picnic

Employees of the Iola, Kan., plant of the Lehigh Portland Cement Co. held an all-day picnic on May 25, the occasion being the celebration marking the completion of ten years operation of the plant and quarry without a single lost-time accident.

Building Materials Profit Increase Over Average

In an analysis of corporation profits for the years 1935 and 1936, covering 1,600 industrial concerns, the National City Bank of New York reports an increase of 52 per cent. In the group of 68 building-materials concerns, however, the increase was 104 per cent.

Bituminizing Plant Under Way in Michigan

The Crown Rock Co., Cleveland, O. has leased water-front facilities at Muskegon, Mich., and is reported to be installing a plant to produce bituminized aggregates. New docks are also planned.

The Marblehead Lime Co., Chicago, Ill., is reported to have purchased additional deposits adjoining its holdings at Quincy, Ill.

. . . Editorial . . . . . .

The Spotlight's on Business

IN THE THEATER of American life to-day business holds the center of the stage. On it is turned the spotlight of a relentless and not-too-friendly publicity; at it is pointed the accusing finger of clamorous labor and consumer pressure groups; toward it is directed the searching gaze of theoretically-impartial but not-always-neutral governments.

Business suffers less from the misrepresentations of those outside than from the false representations of those within. A minority deeply dyed with the errors and misconduct of stupid and dishonest principles gives the color of plausibility to the charges leveled at all business. The job improperly done, the responsibility faithlessly or impartially discharged, the opportunity seized for improper ends—these are some of the infractions of the standards of honorable conduct that, despite their relative rarity, have won for business as a whole the antagonism of large groups of the population and have lost for it the sympathetic understanding that might gladly and ably befriend it in this day of need.

The prevalence of the individualistic philosophy in our life, and its continued reign in the realm of business even after its soundness has been questioned in other walks of life, will account for many of the irregularities that have taken from business the support of a friendly public sentiment. The same false notion of liberty which justifies in one business man's mind the right to cheat, to adulterate, to falsify, even to maim and kill justifies in the disapproving mind of his honorable contemporary a policy of indifferent aloofness that amounts almost to disinterestedness. The man of high standards studiously keeps his hands off, not necessarily so much because he may wish at some future time to enjoy the benefits of a similar "let-it-alone" attitude as because of a sort of blind faith in the theory that the right will prevail. Business men as a class have done very little—partly on account of legal obstacles but principally on account of an exaggerated sense of individual rights—to improve the standards of conduct in their own ranks. Even though the dishonest group in business is a small minority, its actions are spectacular and are suspected of being far more common than they really are. There is nothing dramatic about dealing fairly with either customers, suppliers, workers or competitors; but bribery, embezzlement, fraud, robbery, infringement, oppression, coercion, and the hundred-and-one other forms of inequity and iniquity practiced by some business men win wide attention because they strike the fancy, fire the imagination, and feed that mutual mistrust of our fellows that springs naturally in the human breast. Misbehavior is news and makes the front page, while laudable good conduct passes unnoticed.

Business is paying the price of this lack of self-discipline, this unwillingness to check the ravages of industrial freebooters, who have not only robbed those with whom they dealt but have brought upon all business men the stigma of sharp practice and an utter disregard of public welfare. The buyer who suddenly discovers that his favorite shampoo contains dangerous amounts of arsenic trioxide, even though no hint of the presence of this ingredient appears on the label, is likely to mistrust all shampoos and return to the use of common soap; and when he learns that other governments require that all dangerous constituents of such products be listed on the labels attached to them, he is likely to write his congressman to inquire why Americans are not similarly protected against drugs that are injurious to health. All food, drug and cosmetic manufacturers ultimately suffer through loss of consumer good-will, loss of trade, and the troubles of government inspection that follow the passage of corrective legislation made necessary by the deception of a single manufacturer or a small group of producers.

SIMILARLY, when buyers learn that the "seals of approval" and other forms of certification, supposedly "awarded" only to products that meet certain rigid tests as to quality and fitness for duty, are sometimes actually given without any such investigations, or in ignorance of those products' qualities, or even in spite of easily ascertainable knowledge concerning their shortcomings, they are likely to lose confidence in all laboratories, in all trade associations, in all pseudo-scientific as well as genuinely scientific bodies

and the recommendations that emanate from them. As a result, the findings of many costly research programs, conceived in a spirit of service and conducted with fairness, fall on deaf or skeptical ears and fail to win conviction for principles that may be sound and quite free from commercial bias. Government may often look with suspicion on business organizations seeking legitimate objectives simply because there may have been notable cases of illegal and otherwise improper use of group activity. It is easy to draw general conclusions and make general condemnations on the basis of limited evidence.

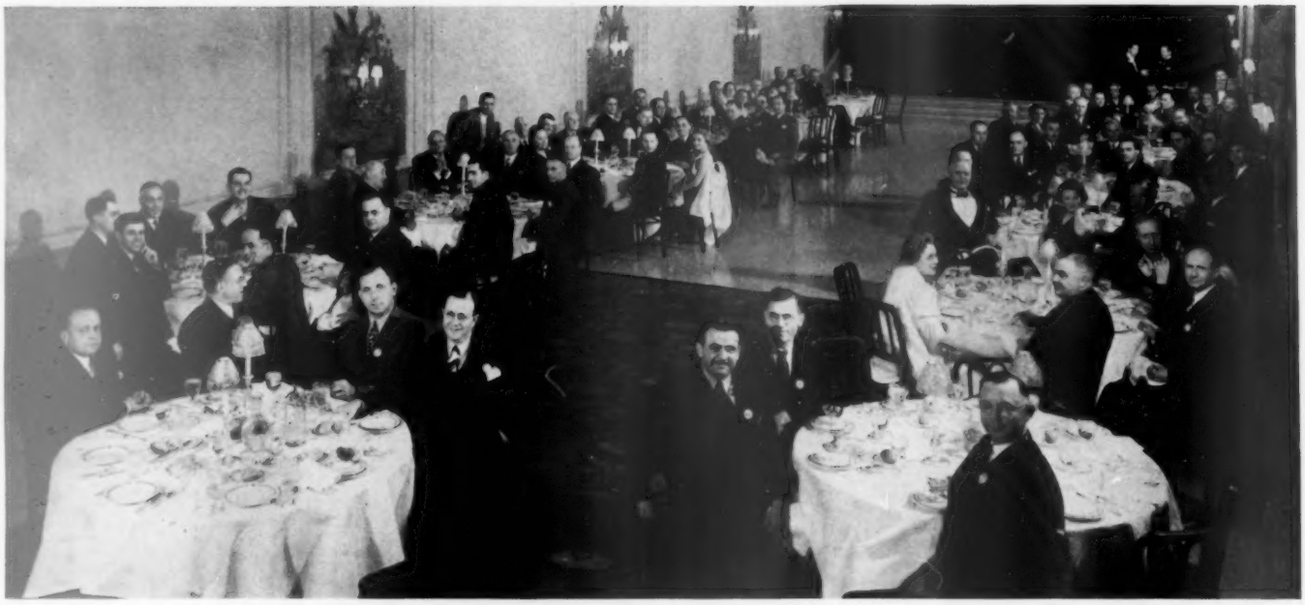
THERE are other aspects of the relations between business and the public, and its attitude toward labor is one of the most important of these. Here, too, the majority suffers from the errors of the minority, quite as much from being forced at times through competitive urges to follow the examples set by the minority as from the public antagonism engendered by "strong" labor policies. The southern aggregates producer who during N. R. A. conference days admitted paying only ten cents an hour—he was actually paying but five cents—to his Negro laborers probably did as much to strengthen the insistence of the labor advisors of the government upon a twenty-five cent minimum in the South as any factual evidence of living costs that was presented. His testimony had the effect of making appear as general practice what was really only an exceptional case, and came as a surprise even to other southern producers who were paying less than the proposed scale.

A relatively small number of employers have acquired the reputation of being "hard-boiled" in their relations with their workers and their policies have been accepted too generally as typical of the attitude of the employing class. Of one such employer a Labor Relations Board said recently that it had exhibited "a callous disregard of the rights of its employees that is medieval in its assumption of power over the lives of men and shocking in its concept of the status of the modern industrial worker." The bad effects of this report arise not so much from its truth or falsity as from the readiness with which it is seized by the public as applicable to all employers. As long as the causes of such a public attitude remain uncorrected it will be difficult for any employer to convince outsiders, to say nothing of his own employees, of the sincerity of his statements regarding his interest in their welfare. Expensive full-page advertisements outlining an employer's labor policy and appearing during times of industrial strife do not win the adherents that their authors count upon, because they come as defenses against attacks and after the damage caused by suspicion had been done.

In all its relations with the public—with consumers, with workers, with competitors—the best element in business life should make the most of whatever it may have done to further harmonious dealings, to promote fairer practices, to eliminate injustices, and to advance the public interest. The "public-be-damned" attitude of earlier generations is a discordant note in modern life, because business is seen to be not the private affair it was formerly thought to be, but a partially, and sometimes nearly wholly, public enterprise in the conduct of which management is entrusted with the powers of direction and is given a compensation proportioned to the degree of success attained at the same time that it is expected to discharge its social responsibilities in a creditable manner. It is not reasonable to expect that the public—composed principally of consumers and workers—will rally to the defense of either business in general or specific employers in particular when these are attacked by consumer or labor groups, if it has not previously been invited to understand something of the problems of business enterprise by a frank discussion of its theories, aims and hazards. Business can not logically be treated as a purely private enterprise when everything runs smoothly and then suddenly acquire a public character the moment that labor, consumer or legislative trouble looms. The theory than it can at will be transmuted from the one form into the other is largely responsible for the coldness with which many appeals for public approval and support are received.

ONE of the greatest tasks before business is this problem of winning public opinion to its side. By exemplary action, by establishing high standards of quality production and high standards of public relations with consumer, workers, suppliers and competitors, and by using every available force for the discouragement of unethical practices in that small minority that has alienated public sympathy—even to the extent of assisting government in the framing of effective preventive and remedial legislation—business can earn a reputation for integrity, fairness, and a concern for the public's interest that will be the greatest asset it could possibly acquire. Business men have accomplished a huge and difficult task in winning public acceptance for their individual products but often they have at the same time traded too heavily on public credulity and good-will. The resulting disillusionment hangs like a millstone about the neck of the legitimate, forward-moving business of to-day.

LIME PRODUCERS CONVENE AT CHICAGO



At the annual banquet of the National Lime Assn., Drake Hotel, Chicago.

BREAKING all previous attendance records but two since 1919, 66 representatives of lime manufacturers attended the 19th annual convention of the National Lime Assn. in Chicago on May 11 and 12. A program designed to interest the practical production man and continuing expansion of the industry combined to make the gathering outstandingly successful. Recent developments in the design and operation of lime kilns, the value of vertical stone pre-heaters on rotary kilns, and control testing were some of the operating men's problems discussed.

S. Walter Stauffer, president and general manager of the National Lime Assn. in *An Appraisal of Association Activities* before the opening meeting emphasized the importance of retaining and further building up the goodwill of the public toward the lime industry and pointed out the results in this direction for which the association has been responsible. The importance of recognizing and promoting new markets was also mentioned. Mr. Stauffer said that the use of chemical lime in water purification has grown steadily for a number of years, even during the depression. Although total lime sales are below the 1929 level, the sale of lime for insecticides has increased since that time. The sales of building lime increased more rapidly than the building volume until 1936, when heavy advertising of competing materials reduced the percentage of lime used in buildings, although the total sales for building purposes continued to increase. Mr. Stauffer described the bulletins, booklets, moving pictures and other promotional methods being used by the association, especially for agricultural lime. In less than a year 296 copies of an educational film on the use of this product have been sold or given to county agents, schools, and other interested parties. Major items on the association's research program at present are the use of lime in concrete and earthquake-proof construction and the fire-resisting qualities of plastic.

Howard R. Staley, research assistant, Masonry Materials Laboratory, Massachusetts Institute of Technology, in *The Bond Layer as Revealed by the Microscope* discussed microscopic studies of bonds in eixsting mortars. These studies, he said, showed that high cement content in mortar makes water-tightness impossible and that a high lime content is necessary to give the mortar the plasticity, adhesiveness and workability necessary for the intimate contact with the brick which is essential to make a water-tight wall. The high-cement mortar is too harsh and leaves voids at the surfaces of the bricks which allow the passage of water. Mortar with a high lime content has voids only near the center of the layer and as these points are not interconnected a water-tight job with the minimum amount of backing results.

According to Mr. Staley, the type of brick used is also an important factor. A highly-absorptive brick causes water loss in the mortar, while a brick with low absorption does not allow an intimate contact with the mortar. A brick with medium absorptive qualities makes a perfect bond possible. In describing the reactions when brick and mortar are placed in contact Mr. Staley said that the brick expands in absorbing water from the mortar and the mortar contracts due to this loss of water. A high-lime mortar remains plastic longer than a high-cement mortar, allowing this volume change to take place without breaking the bond. Proper gradation and the particle shape of the sand are also important but oversanding is less injurious to a high-lime mortar.

Mr. Staley illustrated his talk with a complete series of slides of photomicrograph studies showing the various types of voids found in mortar and their causes, and the bonds between

various building units and mortars. These slides clearly showed the better bond obtained with high-lime mortar and the tendency for voids in this type of mortar to become filled by water crystallization over a period of time. A densification of the mortar at the surface of the brick due to the suction of the brick also improves the bond as time passes.

Mr. Staley finished with the following conclusions:

"1. Intimacy, continuity and permanence of the interfacial bond is necessary for water-tightness of masonry walls.

2. Low-lime mortars give a tentacular type of contact and give neither continuous nor permanent bond with the bricks.

3. High-lime mortars give an intimate, continuous and permanent bond with the bricks.

4. Water penetrates through brick walls, between the mortar and the bricks."

In *Characteristics of Volume Changes in Mortars* and *Lime in Concrete* Walter C. Voss, professor of building construction, Massachusetts Institute of Technology, described a series of tests made under his direction and illustrated these with charts and tables.

The mortar tests were made with three grades of sand having fineness moduli of 2.00, 2.50 and 3.00. High-calcium quicklime in the form of a well-aged lime putty, dolomitic hydrate, and a standard Portland cement were used. In all cases the ratio of sand to cement plus lime solids was made 2.50. These tests went further than previous tests in that the long period over which they were conducted made possible determination of the rate of volume change. All the specimens were stabilized for 298 days before any of the cycles of wetting and drying were started. Burnt-clay bricks were used in all tests.

The following are some of the conclusions arrived at by Mr. Voss as a result of these exhaustive tests.

During the curing and hardening period:

"1. Lime-hydrate mortars proportioned with equal or greater volumes of lime per volume of cement shrink less than cement mortars.

2. Lime-putty mortars proportioned with one-half or greater volumes of lime per volume of cement shrink less than cement mortars.

During wetting and drying cycles:

1. The lime-putty mortars exhibit the best characteristics from the standpoint of magnitude and reduction in magnitude of linear change.

2. Linear changes are not directly proportional to weight changes in any period.

3. These fine sands increased volume changes with cement mortars, but do not aggravate volume changes when high-lime mortars are used."

It was noted during these tests that the largest volume changes always occured on the rough side of the specimens. This is a strong argument for the striking or tooling of joints in order to densify the surface of the joint.

The report by Mr. Voss on tests of *Lime in Concrete* is reprinted in full.

"When one analyzes concrete on the basis of bond, it becomes more and more evident that the same surface and chemical phenomena are at work in concrete as influence masonry walls. It is probably incontrovertible that strength is imparted to the synthetic mixture of sand and stone by the matrix of cement and water. If one applies all the conclusions which have been reached in masonry unit and mortar studies to concrete, the conclusion that lime should be added to concrete is inevitable.

"Concrete, however, must be kept up to high strength and care must be used to maintain this strength. Recently those who are really interested in the continued use of concrete but who realize that the great number of failures of concrete due to weathering call for consideration of density and weatherability for a spell rather than the worship of compressive strength are advocating many processes for accomplishing density.

"The writer is convinced that concrete is nothing more or less than a heterogeneous mixture of irregular masonry units laid by chance in a cement mortar. This prime example of chance masonry workmanship has done many amazing things and everyone admires the continuous study which has been carried on for the purpose of producing better concrete work.

"Let us examine this hypothesis somewhat in detail. The coarse aggregate varies tremendously in internal structure, absorption, shape, unit density, and chemical composition. Likewise the sand in its myriad of gradations and constitution presents the same problem in producing the mortar matrix that is present in masonry construction. Finally the cement-water ratio for the concrete mortar matrix is much higher than for unit masonry work.

"In order not to extend this discussion too much may the writer dare to make a few suggestions for better concrete? Some of these many of you have heard before but in a different way.

"1. The coarse aggregate should be absorptive. Extremely dense aggregate causes the eventual destruction of the bond.

"2. The mortar matrix should be composed of a well-graded sand, and a cement, lime, and water matrix which should be proportioned to contain as much lime as will not reduce the strength below a predetermined point.

"3. Such a combination will provide workability, placeability, will reduce segregation, and will be more water-tight as time goes on.

"The writer is aware of the condemnation which will descend upon him for these suggestions but believes that careful study and test will eventually justify his stand.

"Let us consider the table in the light of these contentions, calling attention to strength and initial linear changes only. Three water-cement ratios are here shown. These are based upon the ratio of water to the cement in each mix, the lime being assumed inactive at these early ages. This fact has been proved often before. Two methods of using lime are shown: namely, as added and as replacements, by weight. The lime used varied from 5 lb. to 20 lb. by 5-lb. increments. The strengths are given for the 28-day and a 5-months period. The linear changes are given for the curing period and for the 98 days subsequent to curing, during which the specimens were kept in a room at 80 degrees F. and 50-per cent. relative humidity. All the specimens, indiscriminately increased in length during curing due to the hydration of the cement. It is evident from these data that an addition of 10 lb. of lime per bag of cement is not detrimental to strength at these periods, and this becomes strikingly evident with the higher water-cement ratios. Twenty pounds of lime is not at all detrimental for the last two water-cement ratios. It can safely be said that the linear-change variations are insignificant in any case and certainly can not be construed in favor of plain cement concrete, the higher water-cement ratio showing values in favor of the use of lime, if any. The greatest net differential linear change as between no

lime and 20 lb. is only .00004"/", which would amount to less than 1/16 in. in 100 ft.

"The lime in these experiments was added by working lime putty (high-calcium) into the mixing water. This method, at present is somewhat doubtful from the point of view of the contractor, but it will not be impossible to find a way to make it practicable. In the meanwhile we will have to use lime hydrate, and this will greatly improve our concrete. The writer may have much more to say about this problem in the near future. The addition of one bag of lime hydrate for each cubic yard of concrete will be a very desirable move."

At the industry lunch those in attendance were entertained by the thought-provoking talk of John G. Beaty, editor of the *Bankers' Monthly*. He told of several types of business mind in a changing world—the jittery mind, the waiting mind, the complacent mind, the aggressive mind and the research mind—and illustrated each type by real-life experiences.

As an example of the research type he cited a man who in these days of mechanical refrigeration made a success of the natural-ice business and later, in spite of the popularity of oil, gas and electric heat, made a success in the coal business. This man, according to Mr. Beaty's account of his experience, found his ice business declining and sought to discover the reasons. He decided to learn more about food preservation than anyone else, and set himself to the task of mastering his subject.

When he felt that he had accomplished this, he knew that the next step was the passing on of this knowledge to the housewives in his community. He went to several local women's organizations and offered to donate to them 25c for each member who would visit his plant on certain days to hear a lecture on food preservation by refrigeration.

Meanwhile he had his artificial-ice plant cleaned and painted and chairs for 50 visitors arranged inside. He spoke to capacity audiences and astonished them by serving ice cream frozen in an ordinary ice-box. Soon he began installing modern ice-boxes in houses where mechanical refrigerators had held sway, but now were forced to give way to the products of a man with the research type of mind.

Some time later, after a local electric-refrigerator dealer had adopted his idea and had begun to sell his merchandise to displace the ice-man's equipment and service, the resourceful owner of the research mind—let us call him Hayward—entered the coal business, another declining industry in his community. Here, too, he studied his problem intently and discovered that the dirty curtains and sooty wall paper of which so many housewives complained were due less to inferior coal than to imperfect combustion and faulty furnaces. It was not long before his competitors were sending him customers, because Hayward had acquired quite a reputation as an expert on heating plants. When one of his competitor's customers would complain about dirty coal she would be told that the trouble was with her furnace and that she would be "smart" to call in a furnace expert. Who?—"Well, Mr. Hayward knows a lot about furnaces," would be the reply and Hayward would be called in. He would have her curtains washed, her wall paper cleaned and her furnace adjusted without cost to her, and when she needed coal she would naturally, out of gratitude, give the order to Mr. Hayward, who let it be known that besides being an expert on furnaces he was also a purveyor of coal. And so by intensive research Mr. Hayward had made of his competitors active and effective salesmen who actually sent customers to him.

It pays to study one's business, Mr. Beaty told his listeners, and the cases he cited caught their attention and carried conviction.

Following the lunch a talking motion picture called *American Standards of Living* was shown. This was a popularized exposition of some of the differences between the American and other standards, and was designed to counteract the growing dissatisfaction among the working classes. It was produced by the National Assn. of Manufacturers.

Russell J. Creviston, advertising and sales promotion, the Crane Co., Chicago, talked about *The Selling Process*. This discussion was principally a description of the methods and procedure of his company.

Lime manufacturers who may often have wondered about *What's on the Worker's Mind To-day* were told some-

EFFECT OF LIME ADDITIONS AND REPLACEMENTS ON CONCRETE

		Water-Cement Ratio (gal. per sack)																		
		6.75						8.20						9.18						
		Specimen Nos.	Compressive Strength		Linear Change			Specimen Nos.	Compressive Strength		Linear Change			Specimen Nos.	Compressive Strength		Linear Change		
			28 Da.	5 Mos.	Curing 1-28	28-126	1-126		28 Da.	5 Mos.	Curing 1-28	28-126	1-126		28 Da.	5 Mos.	Curing 1-28	28-126	1-126
Lime Additions	0	100	2920	3850	+.007	—.059	—.052	200	2430	2100*	+.006	—.063	—.057	300	1670	2525	+.003	—.069	—.066
	5							205	2740	3820	+.007	—.065	—.058						
	10	110	2900	3820	+.008	—.065	—.057	210	2790	3600	+.010	—.069	—.059	310	1930	2770	+.008	—.073	—.065
	15							215	2510	2890	+.008	—.069	—.061						
	20	120	2490	3300	+.012	—.068	—.056	220	2180	2840	+.013	—.069	—.056	320	1810	2095	+.015	—.075	—.060
Lime Replacements Equivalent Wts.	0	100	2920	3850	+.007	—.059	—.052	200	2430	2100*	+.006	—.063	—.057	300	1670	2525	+.003	—.069	—.066
	10							505	2910	3660	+.013	—.065	—.052						
	10	410	2560	3190	+.008	—.061	—.053	510	2340	3210	+.003	—.063	—.060	610	2490	3090	+.009	—.071	—.062
	15							515	2490	3920	+.011	—.067	—.056						
	20	420	1970	2870	+.009	—.064	—.055	520	3160	3290	+.006	—.065	—.059	620	1880	2500	+.023	—.072	—.049

Compressive Strength 3 in. × 6 in. cylinders.
* Omitted from data.

Linear change % of 10 in. length.
+ = increase.
— = decrease.

thing about the subtle workings of the employee's intellect by Whiting Williams, personal-relations expert of Cleveland. Mr. Williams has studied the problems of workers by joining their ranks and working and living with them in mines, steel mills and factories in the United States and foreign countries. He says that 60 per cent. of all workers want jobs regardless of the methods used to get them, 24 per cent. favor the labor union as the means, and 15 per cent. are willing to look to the employer.

In answer to the question, "What makes 90 per cent. of the workers willing to go along with the minority, even if that minority is radical?," Mr. Williams offered the reply that the average worker fears the unjust loss of his job. Every worker, as the speaker explained it, is governed largely by fear in hard times, and by pride at all times. Every worker fears the loss of his job, and this fear is greatest when business declines and men are laid off. Every worker wants to feel that he fills a niche in the scheme of things, that he is important because what he can do is important, and he can prove this to his own satisfaction only by holding a job. Every worker hopes to improve his condition, to better his opportunities, and this hope is greatest when business improves and the demand for his services increases.

"Have we done everything possible to reduce fear on the part of our workers?" asked Mr. Williams. "Have we eliminated favoritism? Have we insured regularity of employment?

"Have we done everything possible to justify the worker in taking pride in his work? Have we done everything possible to justify his hope for advancement for good performance?"

The worker wants the minimum of fear, the maximum of spiritual satisfaction, and the maximum of hope. He prefers to get these things from his employer at no cost rather than from his labor union at $1 or $2 a month. The workers are not radical in Mr. Willliams' opinion and will not follow radical leaders in most cases, because, as one worker expressed it, "they promise too God damn much, too God damn quick."

Mr. Williams cited the Saar Valley as a place free from labor troubles despite the fact that the mine owners are French and the workers German. The French engineers who operate the properties study labor relations as a part of their technical training and spend several hours each day underground with the men in their charge. This develops their understanding of the worker's needs and problems.

At left:
S. Walter Stauffer;
Whiting Williams;
Hayden Brooks;
Theron C. Tayler.

At right:
Lee Trainor;
Helen A. Lyon;
H. A. Huschke;
Ray Hutson;
Roma F. Medford;
Norman G. Hough.

In discussing *Current Federal Trends in Federal Legislation* Abram F. Myers, former chairman of the Federal Trade Commission and now consulting counsel of the lime association, had much of interest to say about recent Supreme Court decisions as evidences of the widening sphere of government influence.

"The Wagner act cases hold that the Congress may regulate the relationship of employer and employee in a factory which derives its raw materials from other states, refines, fabricates or assembles (*i.e.* manufactures) them and sells the finished products in interstate commerce. Thus there has been evolved a theory of a continuing current of interstate commerce from the production of the raw materials through the factory to the purchaser or consumer. Heretofore it was supposed that, while the buying, selling and transportation of goods in such commerce were subject to Federal regulation, the processes of production were a part of the domestic economy of the states, immune from Federal control. Now it would seem that the processes of manufacture, although conducted wholly within a state, are not to be regarded as something separate and apart from the interstate transportation which precedes and follows them, but rather as a 'milling in transit,' a temporary interruption in a continuous interstate movement.

"In four of the five decided cases under the Wagner act, all three of the facts mentioned—(1) the gathering of raw materials in interstate commerce, (2) the manufacturing thereof, and (3) the sale in interstate commerce—were present and these facts were stressed in the opinions. It is interesting to speculate what effect the absence of any one or more of these facts might have upon the applicability of the act to a particular business. For example, what is the situation of a concern which supplies its own raw materials and merely refines them and sells the refined product in interstate commerce? This category embraces the entire mining industry and—of special interest to you—the lime industry as well. The element of buying or transporting raw materials in interstate commerce is missing in such cases, but the evil effects of strikes and other forms of industrial strife upon interstate commerce in the products are equally great. I find no support in the opinion for concluding that the Wagner act does not apply to a concern which supplies its own raw materials so long as the products are sold in substantial volume across state lines.

"Quite clearly the absence of the second factor—manufacture—has no bearing on the situation. There is even greater reason for saying that a concern which buys and sells com-

modities in interstate commerce without doing anything to change their physical condition is subject to the act. This would embrace wholesalers, jobbers, etc., buying and selling in interstate commerce. . . . If any business men to-day derive satisfaction in counting themselves out of the Wagner act, their contentment is likely to be short-lived, as it is probable that many of the states will now enact similar statutes applicable to purely local employments. And it is within the range of possibility than an enlarged Supreme Court may go even farther in extending the Federal jurisdiction or that the administration may seek voluntary adherence to the standards of the Wagner act on the part of employers not now subject thereto by means of a new N. R. A. . . .

"The act, the true title of which is, National Labor Relations Act, provides that 'employees shall have the right of self-organization, to bargain collectively through representatives of their own choosing, and to engage in concerted activities for the purpose of collective bargaining or other mutual aid or protection.' It then declares that it shall be an unfair labor practice for an employer (1) to 'interfere with, restrain or coerce employees in the exercise of' the foregoing rights, said to be 'guaranteed' by the act; (2) to 'dominate or interfere with the formation of any labor organization or to contribute financial or other support to it'; (3) to 'encourage or discourage membership in any labor organization', 'by discrimination in regard to hire or tenure of employment or any term or condition of employment'; (4) to 'discharge or otherwise discriminate against an employee because he has filed charges or given testimony under' this act; (5) to 'refuse to bargain collectively with the representatives of his employees'. Representatives chosen by a majority of the employees in 'a unit appropriate for such purposes' shall be the exclusive representatives of all the employees in such unit for bargaining purposes, although individual employees or groups of employees may present grievances to their employer. The right to strike is expressly reserved to the employees. The National Labor Relations Board is authorized to administer the act, to hear complaints and to issue orders. As an indication of the sweeping authority vested in this board, the orders upheld by the Supreme Court in the recent cases required the re-employment of discharged employees and the payment of accumulated wages. . . .

"As pointed out by Chief Justice Hughes, 'The act does not compel agreements between employers and employees. It does not compel any agreements whatever. It does not prevent the employer "from refusing to make a collective contract and hiring individuals on whatever terms" the employer "may by unilateral action determine". . . . The theory of the act is that free opportunity for negotiation with accredited representatives is likely to promote industrial peace and may bring about the adjustments and agreements which the act in itself does not attempt to compel. . . . The act does not interfere with the normal exercise of the right of the employer to select its employees or to discharge them. The employer may not, under cover of that right, intimidate or coerce its employees with respect to their self-organization and representation, and, on the other hand, the [National Labor Relations] Board is not entitled to make its authority a pretext for interference with the right of discharge when that right is exercised for other purposes than such intimidation and coercion. The true purpose is the subject of investigation with full opportunity to show the facts. It would seem that when employers freely recognize the right of their employees to their own organizations and their unrestricted right of representation there will be much less occasion for controversy in respect to the free and appropriate exercise of the right of selection and discharge.'

"The Women's Minimum Wage Case is of less immediate concern to your industry, but the decision merits attention as it also is indicative of a trend. It sustained as a proper exercise of the police power of the State of Washington, and not violative of the Fourteenth Amendment of the Constitution, a statute providing for a method of formulating, promulgating and enforcing minimum-wage scales for women employed in that state. Many years prior to this decision the Supreme Court held invalid under the Fifth Amendment a similar law enacted by the Congress to provide minimum wages for women employed in the District of Columbia. Since the Fourteenth Amendment imposes on the states the same limitations which the Fifth Amendment places on Congress, the recent decision required that the former decision be overruled. It follows that the Congress and the states, legislating within their respective jurisdictions, are competent to enact minimum-wage laws which must be observed in the employment of women, even though those employed are of legal age to contract in their own right and are sound in mind and body. The decision took account of the facts that women (1) 'are in the class receiving the least pay'; (2) 'that their bargaining power is relatively weak'; (3) 'and that they are the ready victims of those who would take advantage of their necessitous circumstances'. The decision concerns only women, but certain passages lead me to wonder if similar legislation applicable to other 'exploited' classes might not be sustained. No gender is specified in the generalizations of the Chief Justice regarding the power of the state to insure that, in the matter of wages, 'bare cost of living must be met', because 'what these workers lose in wages the taxpayers must pay'; 'the community is not bound to provide what is in effect a subsidy for unconscionable employers', and hence 'the community may direct its lawmaking power to correct the abuse'.

"Already proposals are being discussed for utilizing to the utmost the new and enlarged powers of the Congress. Revival of the 30-hr. week bill was among the first suggestions to be put forth. And the President has been quoted as saying, anent the decision in the minimum-wage case, that minimum wages for women is not enough and that similar protection must be extended to men. . . . The pro-labor elements being uppermost in the Congress, it is a foregone conclusion that any legislation beneficial to labor and not frowned upon by the administration will be passed. The recent flurry over the sit-down strikes afforded ample proof of the strength of the labor *bloc*. However sympathetic one may be with the aspirations of labor, there should be no division of opinion regarding the seizure of property and withholding it from the rightful owners in defiance of lawful orders of the courts. Yet the Senate voted down an amendment to the new Guffey Act condemning sit-down strikes and adopted a resolution on the subject only after there had been included therein an equally vigorous denunciation of unfair tactics allegedly used by certain employers. The criticisms of the Supreme Court issuing from these sources, even after the decisions herein dealt with, indicate that they are determined that the Federal authority shall be extended to all workers in the factories and in the fields, on the railroads and on the ships at sea, and even to those in the darkest subterranean passages of the deepest mines.

"It is fair to say that the way has not yet been cleared for so comprehensive a program. Unless or until the membership of the court is changed,

or the ruling in the *Carter Coal Case* is overruled by the present court, or clarifying amendments are adopted, there will be serious doubt as to whether legislation (1) affecting the wages of adult male workers, or (2) relating to employments not including all three of the elements hereinabove noted, will be sustained. That case involved the first Guffey Coal Law, an extraordinary piece of legislation. Briefly stated it imposed an excise tax of 15 per cent. on the sale of bituminous coal at the mines and then provided for a drawback or refund of 90 per cent. of the amount of such tax to all producers who had filed with the National Bituminous Coal Commission their acceptance of the coal code provided for in the act. The code was to be formulated by the said commission and was to provide, among other things, for the observance of minimum prices for coal, for labor provisions resembling those embodied in the Wagner act, and for minimum-wage scales negotiated and agreed to under the principle of collective bargaining. The Supreme Court held that the so-called tax was actually a penalty in aid of enforcement of the act and that since the labor provisions bore upon the production of coal within the states rather than upon interstate transactions in coal, the so-called tax must fall; further, that since the marketing provisions were inseparable from the labor provisions, they also must fall. Thus the entire act was declared to be unconstitutional without passing upon the legality of the marketing provisions, standing alone. Just recently the Congress has passed a new Guffey Act providing for a code of fair trade practices including minimum and maximum prices, enforced by a 19½-per cent. tax on all coal sold in violation of the code, but without labor provisions except as declarations of policy. The act, however, was strongly supported by organized labor represented by the influential United Mine Workers of America.

"The court did not undertake in the Wagner case to overrule or to distinguish the Guffey Law decision *beyond* saying that that statute was invalid on several grounds—that there was an improper delegation of power, etc.—which does not reconcile the obvious conflict between the two decisions. . . . It is probable that future court battles over the validity of labor legislation will not involve so much fine spun arguments as to what is and what is not interstate commerce, and who are and who are not engaged therein, as whether the activities to be regulated or the abuses to be remedied substantially affect such commerce. In the Wagner case the court accepted the view, stated in the preamble of the act, that strikes and other disturbances resulting from the refusal of employers to recognize the right of workers to bargain collectively, as well as discriminations practiced against workers for union activities, threaten to and often do burden and impede interstate trade and commerce. 'The Congressional authority to protect interstate commerce from burdens and obstructions', said the Chief Justice, 'is not limited to transactions which can be deemed to be an essential part of a "flow" of interstate and foreign commerce. Burdens and obstructions may be due to injurious action springing from other sources.' Assuming that this is the test which will govern future litigations involving the validity of acts of the Congress, can not it be urged with equal reason that the failure of employers to pay living wages, or to shorten excessive working hours, or to afford a safe place to work, also threatens and often results in the same dire consequences?' . . .

"One of the principal tenets of the New Deal is that the government has so long discriminated in favor of industry at the expense of the farmers and laborers that special legislation beneficial to the latter is necessary to bring about a proper balance in the national economy. It is entirely outside the purview of this address to deal with mooted questions of politics, economics and sociology. Moreover, it is much too early correctly to evaluate much of the recent and prospective legislation. For example, the A.A.A., despite much criticism, alleviated a dangerous unrest among the farmers and probably spared the nation a complete collapse in agriculture. The Securities and Exchange Commission Act, designed to eliminate fraud in the sale of securities, may prove in the long run to be highly beneficial to substantial business interests by allaying public suspicion and distrust, enhancing credit and reducing unfair competition. And if labor organizations can be induced or required to assume responsibility for the carrying out of their agreements and for the unlawful acts of their members, in return for their new-found privileges, it may transpire that existing and prospective labor legislation will make for an industrial peace which will redound to the benefit ofall interests alike. Those of us who have had experience with collective bargaining as practiced by some of the older, well-managed craft unions, know that it can provide a degree of stability and confidence that is highly satisfactory from the standpoint of the employers. In any case fundamental changes in industrial relations and business methods are in store for many industries and it is best they should accustom themselves to the new order. . . .

"Only a few minor measures of interest to this group are actually being considered on Capitol Hill. One of these is Senate Bill No. 1077 to amend the Federal Trade Commission Act. The principal change to be effected by this bill is to give the commission authority to prevent the use of 'unfair or deceptive acts and practices' as well as 'unfair methods of competition' in interstate commerce. While 'unfair or deceptive acts or practices' are largely comprehended in the existing prohibition against 'unfair methods of competition', the new language is made necessary by the ruling of the Supreme Court in the *Raladam Case*, that one of the facts necessary to support the jurisdiction of the commission in any case is the existence of competition. This imposed upon the commission the burden in every case involving fraudulent and deceptive practices of showing that competitors, legitimate or otherwise, of the concern engaging in such practices were injured thereby. It is evident that this bill, which has already been passed by the Senate, will greatly strengthen the commission in its efforts to protect honest business and the public against fraudulent enterprises which now enjoy immunity under the law. The bill also will establish beyond controversy the power of the Federal Trade Commission to institute economic investigations 'upon its own initiative', a point that has been sharply contested both in the commission and in the Congress. The Economic Division, pursuant to direction of the commission, has conducted constructive investigations in reference to resale-price maintenance and basing points; and if the commission exercises its powers in the future as wisely as it has in the past, legitimate business will have nothing to fear from its activities in this connection.

"Most business men and all trade-association executives are anxious to learn whether prospective legislation relating to minimum wages, maximum working hours, etc., will include or be supplemented by provisions for co-operative machinery to stabilize markets, eliminate wasteful competitive practices, and otherwise assist industry to sustain the additional burdens which may be imposed upon it. The

N. R. A. in the beginning was in the nature of a compact between the government and industry whereby industry assumed the burden of the labor provisions of the act upon assurances freely given that the government would encourage and protect it in constructive co-operative endeavors. But the N. R. A. sought to cover too much ground, the problems of administration proved to be insuperable, and the Blue Eagle was doomed before the Supreme Court brought it to earth. Those of us who had advocated the principles of industrial co-operation under governmental auspices long before the N. R. A. came into being, while glad to be relieved of a burdensome administration which was fast disrupting the industries that we served, were nevertheless saddened by the failure of an undertaking in which we placed so much hope. I believe that the preponderance of opinion in industrial circles favors the establishment of some method whereby the competitive problems of industry can be worked out co-operatively under the watchful eye of the Federal Government and without undue interference on the part of inexperienced and opinionated bureaucrats. The tragedy of the N. R. A. was its maladministration.

"Possibly the only hint as to what is in store in this connection is to be gleaned from the recommendations of Major George L. Berry's Council for Industrial Progress. The extent to which this movement enjoys the support of the administration has been shrouded in mystery. Speculation on this point, rife on the eve of the December mass meeting, undoubtedly tended to discourage attendance by the responsible heads of industry. However, the membership list of the council contains the names of many prominent trade-association executives (probably without authority to bind their industries), as well as leaders in the field of organized labor, from whose ranks Major Berry sprang. The recommendations of the council, together with draft bills embodying them, have been submitted to the President. Chief among these recommendations are: (1) the establishment of schedules of maximum working hours and minimum wages for each of the several industries and trades and the abolition of child labor; (2) establishment of enforceable rules for outlawing unfair methods of competition; (3) amendment of the anti-trust laws to permit, without jeopardy, co-öperative action to maintain fair methods of competition; (4) establishment of a National Economic Council to conduct economic studies; (5) establishment of a system of government insurance of commercial loans to small enterprises; and (6) authorization of a complete national census of unemployment every five years, supplemented by periodical between-census checks, to give a 'running inventory of employment and unemployment'.

"The report of the Committee on Fair Trade Practices adopted by the council in March, 1936, reflects a reaction from the grandiose schemes of the N. R. A. and harks back to the Nye Bills of 1932. That is to say, the committee recommends that provision be made for enforcing the so-called Group II Rules when adopted by a substantial majority in an industry and approved by the Federal Trade Commission. The provisions specifically recommended for inclusion in the category of enforceable rules were, for the most part, the routine rules of the trade-practice-conference procedure, such as prohibitions of sales below cost 'when made for the purpose or with the effect of injuring a competitor or misleading the public'; the employment of loss-leaders for a similar purpose; circulation of false or misleading information; defamation of competitors; including breach of contract; misbranding, etc. The suggestions relative to price discrimination, granting of rebates, etc., have been merged in the Robinson-Patman Act. The only proposal not of a routine nature was that open-price reporting be permitted and sponsored by the government, 'with the understanding that no such plan shall be used as a device or cloak for price-fixing'. The report contained no information or suggestions relative to the details for ascertaining 'cost' or enforcing a provision against selling below cost; or as to the nature of the safeguards to be erected against price-fixing. . . .

"It would be a relief to business men and their lawyers if the Congress or the courts would clear up the prevailing uncertainty in reference to open-price reporting. As matters now stand the practice has been upheld in only one case—that involving the Sugar Institute—and there the Supreme Court emphasized two peculiarities of the sugar business: the standardized nature of the product and the pre-existing custom of selling pursuant to publicly announced prices on 'moves'. While it would seem that any attempt to distinguish between an industry where price publication has been a matter of custom and one where it grew directly out of an industry agreement would be unsound, nevertheless adoption of the practice by the latter method involves elements of risk which many industries are unwilling to incur. And assuming that such a policy can be lawfully instituted, it still must be carried on without any agreement express or implied among the members participating therein that the prices openly announced shall be adhered to in any and all transactions. Up to this point the ruling in the *Sugar Institute Case* is a little like the permission given by the lady in the familiar couplet to her daughter who wanted to go swimming. But the situation is even more complicated since the enactment of the Robinson-Patman Law, under which any departure from published prices would constitute *prima facie* evidence of unlawful price discrimination. Thus we have arrived at the happy state of affairs where an industry employing the open-price policy must tread softly lest the Federal Trade Commission prosecute it for too rigid an adherence to published prices, on the one hand, or for too lax an adherence thereto, on the other hand. If any of my listeners think this is far-fetched, let them compare the complaints recently issued by the commission under the Robinson-Patman Act for alleged price discrimination with those issued under Sec. 5 of the Federal Trade Commission Act charging price-fixing growing out of N. R. A. Code procedure."

Mr. Myers also spoke briefly about possible tax legislation and the Robinson-Patman Act.

In *Recent Developments in Design and Operation of Lime Kilns*, Victor J. Azbe, consulting engineer, St. Louis, Mo., gave his ideas of the progress that has been made by the lime industry in improving operations and what the future holds in store. He believes that the kiln of the future will have to be able to produce from two to four times the amount of lime the old kilns were capable of with no more labor. The fuel ratio will have to be twice as great, lining life will have to exceed a year, and all this will have to be done at low cost so that production costs will actually be decreased.

In discussing the heat balance of lime kilns Mr. Azbe pointed out the various factors which must be considered in each individual operation. These factors include preheating of the lime, the type of fuel, and characteristics of the raw material. To illustrate this subject he used a heat-flow diagram of an ideal natural-gas-fired kiln. This diagram emphasized the importance of cooling in obtaining kiln efficiency, a subject which, according to Mr. Azbe, is seldom given

the attention it deserves. A table of the various factors entering into ideal lime-kiln performance was also presented. Other illustrations included a chart of waste-gas temperatures of different kilns, both vertical and rotary; a drawing of a high-capacity producer-gas-fired vertical kiln; an idealized rotary lime kiln with vertical stone preheater and lime-finishing and -cooling chambers; and a composite vertical lime kiln.

In Mr. Azbe's opinion the rotary kiln is much less efficient than a vertical kiln and in a long rotary kiln the first 200 ft. will do no more preheating than 2 ft. in a vertical kiln. His idealized rotary kiln will, he said, give the best product, highest fuel efficiency and highest capacity of any rotary type. He also cited several plants which are using his methods.

The next speaker, D. C. Henderson, general superintendent of the Winnipeg Supply & Fuel Co., Winnipeg, Canada, described *Lime Burning in a Modern Canadian Plant*. In his plant power is generated with two Diesel engines, one twice the size of the other, giving three power ranges to meet varying conditions. The limestone has a 97-per-cent. calcium-carbonate content and four vertical kilns 70 ft. high with 11-ft. outside diameter shells are used.

Wood was originally used as fuel but this has become scarce and is now supplemented by an automatic gas producer. With wood the fuel costs were $2.25 to $2.75 per ton of lime; coal costs $9.50 per ton and is shipped 1,200 mi. In 1929 the entire plant was rebuilt to use producer gas and a 4.85 to 1 fuel ratio is now obtained on this gas and 3 tons of lime to 1 cord of wood when wood firing. With an inside kiln section of 5 ft. 5 in. by 8 ft. 50 tons of lime is being burned daily with little labor and repair expense.

According to Mr. Henderson, no satisfactory results were obtained until operations were simplified to the greatest possible extent. Now the operator needs only to watch his discharge-gas temperature and draft and the kilns are drawn every hour. The lime is drawn cold. The use of comparatively small stone, 5 in. maximum, and many small gas outlets give an even distribution of gas in the kiln. The top of the kiln is sealed tight and is opened only when loading. The draft is furnished by a fan.

The excellent results being obtained are attributed by Mr. Henderson largely to the company's policy of encouraging employees to make suggestions and of consulting experts on this subject. At present the kilns are insulated with 3 in. of zonolite poured between the shell and the bricks. Experiments are now being conducted with zonolite blocks.

The important factors which make possible the results obtained are listed by Mr. Henderson as follows: "(1) Deep fuel bed; (2) tight doors; (3) small grate area; (4) high kilns (or good draft); (5) leak-proof walls; and (6) restricted top opening."

Theron C. Tayler, vice-president of the Belle Isle Lime Co., Detroit, Mich., in a paper entitled *Value of Vertical Stone Preheaters on Rotary Kilns* gave some preliminary operating figures on the company's new plant. The chief feature of this plant is the rotary kiln with a vertical stone-preheating chamber and vertical lime-finishing and -cooling chambers. The figures given represent some improvement over those in an article describing this plant published in the March, 1937 issue of PIT AND QUARRY.

Mr. Tayler opened with a brief history of the use of preheaters on rotary kilns in the cement industry. In his opinion similar devices of a less complex and expensive nature can be advantageously applied to rotary lime kilns. The rotary kiln, he states, is a poor form of heat exchanger as the hot gases rise to the top and the cold stone hugs the bottom, but it makes a suitable combustion chamber for a long flame and is suitable for the high-temperature end of the burning operation. For efficient heat exchange he recommends passing the hot gases through the bed of the stone as is done at his plant.

The gases leave the rotary kiln and enter the preheater in the Belle Isle plant at 1,300 to 1,500 deg. F. and leave the preheater at 300 to 600 deg. Stone enters the preheater cold, wet, and sometimes frozen, and leaves it at 1,300 to 1,500 deg. Radiation losses from the preheater are negligible, according to Mr. Tayler. With this arrangement the 6-ft. by 100-ft. kiln, which was rated at 40 tons per day, is now producing 50 tons and is expected to do much better.

A rough heat balance under present conditions follows:

8,000 lbs. stone per hr. heated to 1,400 deg. needs 8,000 x .22 specific x 1,400 deg.	= 2,464,000 B.t.u.
Evaporating 2½ per cent. water and converting it to steam at 400 deg. takes .025 x 8,000 x 1,250 B.t.u. per lb.	= 250,000
Total heat to stone	2,714,000 B.t.u.
Heat from gases (assuming 11 lb. air per lb. of fuel [800 lb. fuel x 12 lb. + (8,000 lb. stone × 44 per cent. CO_2)] × .24 specific heat × 1,400 deg. —400 deg.)	= 3,148,800 B.t.u.
Difference, loss by radiation, etc.	434,800 B.t.u.

In closing Mr. Tayler made the following recommendations for using a system of this kind.

"Experience has taught us the necessity for some safety precautions. If powdered fuel is used, there are times when an excess will pass unburned through the kiln. There must be no ledges or places where it can accumulate.

"Gas may, under some conditions, accumulate in a preheater and if given air becomes an explosive mixture; hence the necessity for kiln seal rings and other precautions against air leaks. Explosion doors add to the safety.

"There must be ample free area through the stone bed, because an excessive draft pressure means excessive power consumption. This is a matter requiring much detailed study and experimental data which have been utterly lacking.

"Materials must be found suitable for temperatures obtained or provisions made to limit temperatures. Provisions must be made for expansion and contraction."

Mr. Tayler also described changes made in the Detroit building code which require the use of more lime in mortar. He distributed copies of a circular published by his company incorporating the present building-code mortar requirements and comments by the company on these provisions.

Control Testing and Consumer Satisfaction, by H. N. Huntzicker, U. S. Gypsum Co., Chicago, Ill., deals with a phase of lime production which is too often neglected. In this paper the reasons and the necessity for making certain tests are emphasized. Mr. Huntzicker stressed in particular the importance of selecting control tests that came as closely as possible to being duplications of consumer usage. Many of these tests were described and tables giving typical results were used to illustrate his points.

This paper is too long to present in full in this convention report and is far too important to be merely abstracted. It represents the testing

technique and methods of one of the largest producers of lime possessing laboratory facilities and employing talent far beyond the reach of the average producer. This paper will be reprinted in full in an early issue of PIT AND QUARRY.

J. Morley Zander, secretary and general manager of the Saginaw Brick Co., Saginaw, Mich., spoke on *The Use of Lime for Bricks and Blocks*. He stressed the importance of this market to lime producers and said that an average sand-lime-brick plant producing 30,000 bricks daily uses from 1,000 to 1,200 tons of lime annually.

Mr. Zander briefly described the history of the sand-lime-brick industry and some of the important developments and process improvements which have made it a permanent and successful industry. The most important factors in the production of high-grade bricks, he said, are accurate measuring and thorough mixing of ingredients. His paper is reprinted in full in The Profitable New Products Section of this issue of PIT AND QUARRY.

A relatively small but increasing use of lime was thoroughly reviewed in the paper *The Role of Lime in the Battle Against Insects and Diseases Affecting Plants*, read at the opening of the final session on Wednesday afternoon by Prof. Ray Hutson of the department of entomology of the Michigan State College of Agriculture, East Lansing, Mich.

Prof. Hutson pointed out that the total lime used for this purpose (insecticidal and fungicidal) was 19,269 tons in 1928. During the depression years this was increased slightly, a marked gain being recorded in 1934 when 29,319 tons were used and a peak reached in 1935 with the employment of 38,428 tons. These figures, he pointed out, are probably too low but serve as a guide to greater tonnages to be used in the future.

Of the various preparations in which lime is used in the fight against plant diseases, Prof. Hutson said that the use of calcium arsenate, lime sulphur and Bordeaux mixtures still predominate. Many of his listeners who were aware of the large amount of whitewash (lime and water) used to paint tree trunks to repel insects learned something new when Prof. Hutson declared that tests have proved that it is not the chemical action of the lime that accomplishes the purpose but the whiteness of the coating which reflects light and heat and creates a condition unfavorable to borers and other harmful insects.

In summarizing Prof. Hutson pointed out that the two primary features favoring the use of lime in battling the insect enemies of plant life were its effectiveness and economy, while the matter of injury to foliage was probably the only unfavorable factor. Study of this matter of defoliation has been given too little attention, he declared, and he suggested diligent research to that end.

Secretary Brumbaugh, who presided at the session, read the report of the 1936 lime safety contest conducted by the U. S. Bureau of Mines, which appears elsewhere in this issue. In connection with accident-prevention work in the industry, he reported that the board of directors had announced the formation of the "1,000-Day Club," open to those plants having run 1,000 consecutive days without a lost-time accident. Appropriate certificates or awards will be made to those plants which achieve this record, he declared.

Officers for the coming year, recommended by the board of directors, were unanimously elected as follows:
Henry La Liberte, chairman, board of directors, Cutler - Magner Co., Duluth, Minn.
S. Walter Stauffer, president and general manager, N. L. A.
W. V. Brumbaugh, secretary and assistant treasurer, N. L. A.
James H. McNamara, treasurer
Eagle Rock Lime Co., Eagle Rock, Va.
Roma F. Medford, assistant secretary, N. L. A.

District directors who will form the directorate for the coming year were chosen as follows:

District 1
C. C. Loomis, pres.,
New England Lime Co.,
Adams, Mass.

District 2
H. D. Brigstocke, vice-pres.,
Thomasville Stone & Lime Co.,
Thomasville, Pa.

District 3
Reed C. Bye,
American Lime & Stone Co.,
Philadelphia, Pa.
A. M. Tyree, sec.,
North American Cement Corp.,
Baltimore, Md.

District 4
James H. McNamara, pres.,
Eagle Rock Lime Co.,
Eagle Rock, Va.

District 5-A
William F. Stolzenbach, pres.,
National Mortar & Supply Co.,
Pittsburgh, Pa.

District 5-B
Russell Rarey, vice-pres.,
Marble Cliff Quarries Co.,
Columbus, O.

District 6
Gordon W. Hughes, sales mgr.,
Inland Lime & Stone Co.,
Manistique, Mich.

District 7
(Election not completed)

District 8
(Election not completed)

District 9
Henry La Liberte, pres.,
Cutler-Magner Co.,
Duluth, Minn.

Districts 10 and 11
Warren Lewis, vice-pres., & gen. mgr.,
Longview-Saginaw Lime Works,
Birmingham, Ala.

District 12
J. F. Pollock, vice-pres.,
Ash Grove Lime & Portland Cement Co.,
Kansas City, Mo.

District 13
Cecil R. Haden, sec.,
Haden Lime Co.,
Houston, Tex.

District 14
Paul H. McMillin, sec.,
Roche Harbor Lime & Cement Co.,
Roche Harbor, Wash.

District 15
(Election not completed)

Messrs. La Liberte and Bye and J. M. Gager (Gager Lime Mfg. Co.), G. J. Whelan (Kelley Island Lime & Transport Co.) and B. L. McNulty (Marblehead Lime Co.) will form the executive committee.

One of the closing actions of the convention was a memorial resolution to those in the industry who passed away during the last year. The roll of the dead included the following: Sidney P. Armsby, formerly of the Haden Lime Co.; Chas. F. Henning, United States Gypsum Co.; S. W. R. Dally, Orcas Lime Co.; R. F. Mather, Pacific Lime Co., Ltd.; John S. McMillin, Roche Harbor Lime & Cement Co.; Lucius P. Dillon, James River Hydrate & Supply Co.; Ralph P. Wilton, Steacy & Wilton Co.; Gordon Willis, Hunkins-Willis Lime & Cement Co.; and William J. Grove, M. J. Grove Lime Co.

10 YEARS WITHOUT A LOST-TIME ACCIDENT!

SAFETY FOLLOWS WISDOM
PORTLAND CEMENT ASSOCIATION
SAFETY TROPHY AWARDED
LEHIGH PORTLAND CEMENT COMPANY
IOLA KANSAS PLANT FOR A
PERFECT SAFETY RECORD IN 1927
REAWARDED FOR A PERFECT
SAFETY RECORD IN 1928
1929 — 1930 — 1931 — 1932
1933 — 1934 — 1935 — 1936

APPROXIMATELY $14,000 in awards were distributed among employees of the Iola, Kan., mill of the Lehigh Portland Cement Co. on May, 25, by Joseph S. Young, president of the company, as "tangible evidence" of the company's appreciation of their all-time industrial record of ten consecutive years' operation without a lost time accident.

The announcement came as a surprise climax to a program of speeches and awards in celebration of the ten-year safety record. The program was broadcast over radio station KGGF at Coffeyville.

The awards ranged from a minimum of $10 in cash to a maximum of approximately $200 in Lehigh stock. All awards were based on length of service regardless of position or salary. Mr. Young made it clear that while he hoped as many of the employees as possible would keep the stock, they could feel entirely free to exercise their own discretion in converting it into cash if they so preferred. He also announced a new company policy of giving all employees who had been with the company one year or more, mill workers included, one week's vacation with pay, making the occasion a happy one indeed for the 148 men and women on the payroll of the Iola plant.

Aside from the unexpected announcements by Mr. Young, the afternoon program was chiefly featured by the presentation of two safety awards. One was the re-award of the cast-stone safety trophy of the Portland Cement Assn., that has graced the Lehigh grounds since 1927, and the other was a special certification of award from the Joseph A. Holmes Safety Association.

The cement association award was made in an address by Edward J. Mehren, president, who called attention to the astonishing safety record that has been established by the cement industry since the first award was made in 1923. Since that time, 118 of the 166 cement plants in the United States have received trophies for the completion of one year or more without a lost-time accident. Thirteen plants have joined the "Thousand Day Club," and one plant has most nearly approached the Iola record by operating seven years without an accident. Last year 36 plants had no accidents.

In his presentation speech, he made it clear that "we do not make safety awards to machinery, but to men." He gave full credit to the men of the plant for accomplishing in a spirit of co-operation what no amount of ma-

(Continued on page 59)

E. J. Mehren, president, Portland Cement Assn.

Workers at Iola assembled in benches before speakers' stand at the ceremonies commemorating 10 years of no-accident operation.

C. A. Swiggett, superintendent at Iola plant.

Temporary Dredging Plant Built to Supply Aggregate For Mississippi Road Work

THE highway construction program under way in the state of Mississippi has resulted in the establishment of numerous small plants of a more or less temporary nature which supply sand and gravel for certain sections of highway until these are completed and then are moved to other locations. This condition is due to the fact that existing plants have neither the combined capacity necessary to meet this temporary large demand nor are these plants so located that they can supply material economically to all parts of the state. As most of these temporary plants are supplying concrete aggregates, which must pass fairly strict specifications, many of them are interesting because of the amount of high-grade material they can produce with little equipment and investment.

A large proportion of these temporary plants are operated by established sand-and-gravel producers having permanent operations in Mississippi or neighboring states, some are operated by contractors, and others by individuals or companies. Few of the latter have had any previous experience in the production of sand-and-gravel. The plant described in this article comes under the first classification. It is owned by the Radcliff Gravel Co., Inc., of Mobile, Ala., one of the oldest and largest sand-and-gravel producers in the South. The operation of this plant is carried on under the personal supervision of R. H. Radcliff, president of the company.

This plant was put in operation in September, 1936 on property located about 7 mi. north of Charlestown, Miss., near the northwestern corner of the state. Both concrete aggregate and road gravel are being produced by this plant, which has a capacity of about 50 cu. yd. of sand and the same amount of gravel per hour.

The deposit supplying this plant is leased on a royalty basis and contains ample material for the road work in this section. The dredge pond was formed by damming a small creek traversing the property. The material at this point contains about equal amounts of sand and gravel and is being dredged to a depth of over 30 ft. An average of about 2 ft. of overburden is caved in with the material after trees, bushes and other vegetation have been removed. Surrounding the present dredge pond are hills of sand and gravel which range up to 60 ft. in height and on which there is almost no overburden.

The dredge is supported on cypress pontoons and has a plain suction nozzle. The 8-in. Morris dredge pump is driven through a flat belt by a 120-hp. Fairbanks-Morse Diesel engine, which also drives a 35-kw. Fairbanks-Morse alternator that supplies power for the plant equipment. Two small centrifugal pumps supply cooling water for the engine and the pump bearings, while a small compressor furnishes air for starting the Diesel engine.

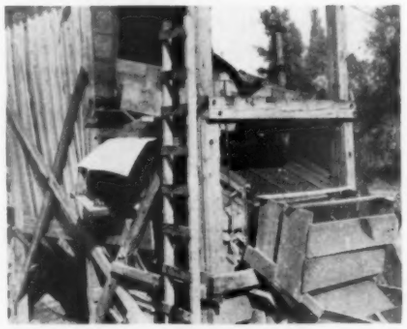
The dredge line is at present about 300 ft. long and discharges into a feeder box at the plant. The floor of this box consists of a section of 2¼-in. wire cloth under which is a section of ½-in. cloth. The material retained on the top screen consists of trash and a small amount of oversize gravel which is wasted back into the dredge pond.

The gravel retained on the second screen section drops on a 4-ft. by 8-ft. Niagara triple-deck screen. At present, for concrete aggregate production, only two decks are being used. The top deck has 1¼-in. wire cloth which breaks the impact of the material on the second deck, which has ½-in. cloth. This arrangement also increases the efficiency of the lower deck in removing fine material from the gravel. The material retained on both screen decks is discharged into a double-screw Perfect classifier where fresh water is added for the final washing of the gravel. The dewatered gravel is discharged on a 20-in. by 66-ft. Barber-Greene portable belt-conveyor which discharges it into a bin. This conveyor has a steel-truss frame which is supported at one end on the ground and at the other end on the bin framework.

The fine material and water passing through the ½-in. stationary screen,

The screening and storage plant as seen from dredge.

The timber storage bins with conveyor from screening plant at right.



The 4-ft. by 8-ft. 3-deck screen which does all gravel sizing.

The screen with screw classifier at right. Truck mounted crane is used for rehandling.

One of the trucks with bottom-dump trailer used to haul gravel.

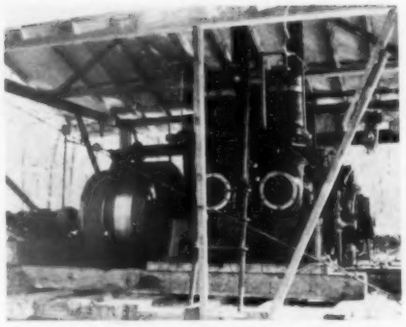
together with the material passing through the bottom deck of the vibrating screen, are discharged on ¼-in. stationary screens over two conical sand-settling tanks. These are used for the production of concrete sand which is then discharged by a bucket-elevator into a dewatering box. An 18-in. by 50-ft. Barber-Greene portable conveyor mounted on wheels discharges the sand into a bin.

The ¼-in. to ½-in. material retained on the screens over the settling tanks is at present flumed to waste in the pond. Later some of this material may be sold for second course on bituminous pavements. In this case a third deck with ¼-in. cloth would be installed on the vibrating screen. This present waste amounts to only about 5 per cent. of the total amount of material produced.

The sand and gravel are stored in a V-shaped timber bin with two compartments of about 50-ton capacity each. These materials are discharged from the bins into trucks which haul them to the railroad-shipping point at Charleston. There the trucks dump from a ramp into a hopper which feeds a belt-conveyor discharging into cars on the Illinois Central Ry. The company owns a fleet of five International trucks with 5-cu. yd. Carlisle bottom-dump steel bodies. At the the plant a Browning ⅝-cu. yd. gasoline crane mounted on a Mack truck chassis is used for general utility and can take the place of any of the conveyors or the elevator if necessary.

The double-screw washer which gives gravel final cleaning.

The Diesel engine, according to Mr. Radcliff, has been a very satisfactory investment. Of the 120-hp. developed by the engine, the pump requires about 51-hp. when operating under full load. The generator connected to this engine supplies 220-v. current for lights as well as for all plant motors. These motors total 40½-hp., but only 31-hp. is actually required to run the plant. The Diesel engine consumes about 3.45 gal. of Texaco 30-32 specific gravity fuel oil per hr. and the lubricating-oil consumption is negligible. The fuel oil costs 7c. per gal., including all



The 120-hp. Diesel engine which operates dredge pump and generates power for plant.

taxes, delivered at the plant.

Wash-water for the plant is supplied from the pond by a 4-in. Steam Pump Co. centrifugal pump which is driven by a gasoline engine. This engine uses 15 gal. of gasoline costing $2.75 in a 10-hr. day, a fuel cost exceeding that of the much larger Diesel engine which operates the entire plant and dredge. It is planned to replace this engine with an electric motor. The Diesel engine is well able to carry this additional load and a further addition which will be created by a contemplated enlargement of the plant.

Iola

(from page 57)

chinery safeguards could ever duplicate.

R. E. McDonald, mill foreman and chief engineer, accepted the award on behalf of the employees, pledging their continued efforts in maintaining the record of safety which merited it.

The Joseph A. Holmes award was made by Dan Harrington, secretary of the Holmes association which is organized to promote safety among mining and mineral industries.

"In all the history of modern industry," he declared, "I haven't the slightest hesitation in saying that the record of the Iola plant stands alone. To have produced 5,959,682 bbl. of cement in mills that present almost every hazard to employees that there is over a period of ten years without a single lost-time accident is a record that has not been duplicated in the world."

This award was accepted for the employees by J. A. Fisher, quarry foreman, who also pledged the continued zeal of the employees in maintaining their safety work.

G. Clay Baker, formerly of the Kansas Labor and Workmen's Compensation Commission, spoke briefly expressing the elation of his commission in discovering such a group as those before him—whose united effort makes less instead of more work for him and his colleagues.

Charles F. Scott, editor of the *Iola Register,* also spoke on behalf of the citizens of the town expressing the pride of the entire town in a record which not only reflects infinite credit on the men of the plant, themselves, but which has literally made the name of Iola known around the world as the town in which is located the plant with the greatest safety record in all industrial history.

Col. Henry A. Reninger, special representative of the Lehigh company, has been in Iola many times before and spoke only long enough to extend his greetings to the group and introduce Mr. Young, president of the company.

Mr. Young declared that he was there to "give tribute to the men of the Iola plant for accomplishing the seemingly impossible!" He recalled that it was not so long ago when, for a plant to go through one year without a lost-time accident, was "approaching the miraculous." That was in 1924 when the first safety award was made at Mitchell, Ind. "The following year," he said, "Iola started on its long and courageous ten-year march toward a goal that not even the most optimistic believed could possibly be attained."

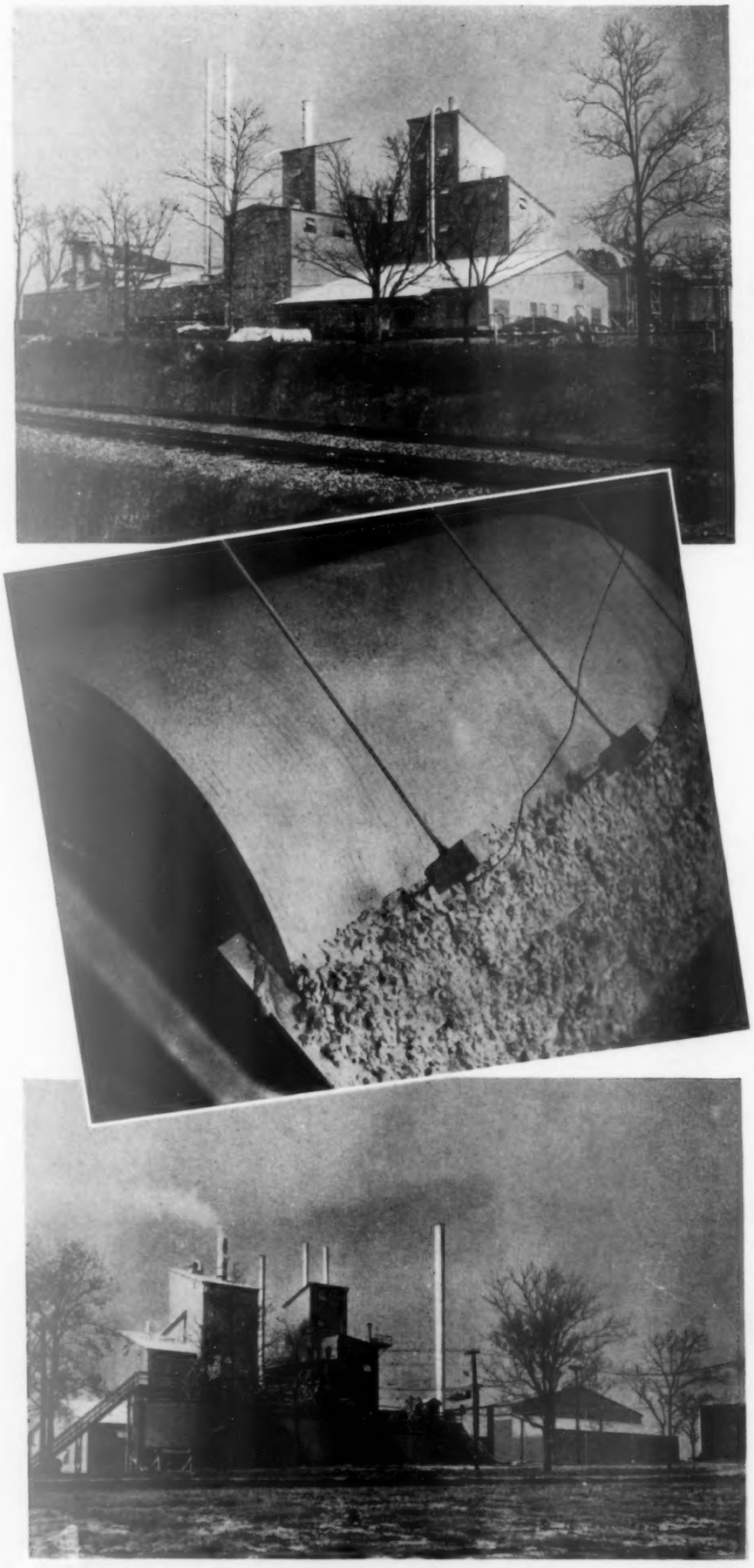
"That complete reversal of performance," he declared "didn't just happen. You can't make a highly dangerous plant a place of comparative safety overnight. Moreover, it is physically impossible to convert careless and negligent workmen into safe and alert employees in a twinkling of the eye."

What happened, said Mr. Young, was a change in the attitude of the men which transformed them from "a bunch of indifferent and disinterested workmen into an organization of cautious and alert employees," who not only had a proper regard for their own personal safety but exercised "team play" to the point of watching out for the other man's safety as well.

"Apart from the saving of life and limb, in my opinion the most important advantage to be gained from safety work is the development of this higher degree of co-ordination. No safety record is possible without co-operation and no co-operation is possible without a close personal and harmonious relationship between all employees from the president down. No victory was ever won without team play."

In the distribution of awards, Mrs. Harry Jeffers and Mrs. William Ledford, widows of long-time Iola employees who recently died, were included with the bonuses that would have gone to their husbands.

C. A. Swiggett, superintendent presided over the meeting. Many cement officials from Kansas and nearby states were guests.



Two views of the Filtrol Corp. plant and, in center, the 8-ft. by 12-ft. drum-type filter which removes much of the moisture from the slurry.

PROCESSES

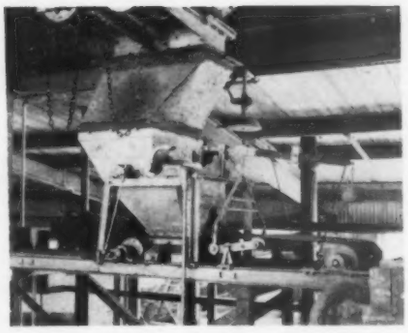
PROBABLY the most important recent development in the filter-clay industries is the modern new plant of the Filtrol Corp. at Jackson, Miss. The plant, which went into operation in May, 1936, has a capacity of 75 tons in 24 hr. of "Super Filtrol," an acid-treated bentonite bleaching agent for cottonseed, linseed and petroleum oils. The Filtrol Corp. is the sole licensee in the United States for the manufacture and sale of acid-activated clay for the clarification, decolorization and neutralization of petroleum oil under patents owned by the Contact Filtration Co. The Filtrol Corp. was formed in 1935 and is jointly owned by the Filtrol Co. of California, an independent filter-clay producer, and the Attapulgus Clay Co., which is jointly owned by the Atlantic Refining Co. and the Standard Oil Co. of New Jersey.

The acid-treated product of this plant is made with different degrees of fineness ranging from 75 per cent. through 200-mesh and up as required. While it is more expensive than natural clays, including fullers' earth and some bentonitic clays, its higher efficiency is said to outweigh this factor. In a modern physical-control laboratory at the plant rigid tests are made to show what the product will do under conditions similar to those under which the product is used. These products are tested on the actual oils for which they are to be used. Some untreated bentonite is also produced.

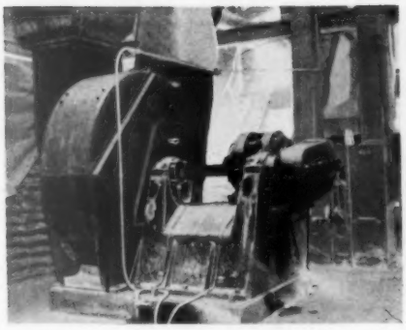
The bentonite deposit supplying this plant was discovered in 1933 by the Attapulgus Clay Co. It is located in northwestern Smith county, 14 miles south of Morton, Miss., and 30 miles east by southeast of Jackson. The deposit consists of 3 ft. of bentonite which has an overburden averaging 18 ft. in thickness. The overburden is removed by a Bucyrus-Monighan walking drag-line fitted with a 100-ft. boom and a 3-cu. yd. bucket. This machine has an Atlas Imperial Diesel-electric drive. The overburden is stripped in two levels in cuts 50 to 60 ft. wide with the drag-line always on the second level and overcasting material from both levels back into the worked-out section of the pit. A Bucyrus-Erie $\frac{3}{8}$-cu. yd. crawler drag-

By W. E. TRAUFFER

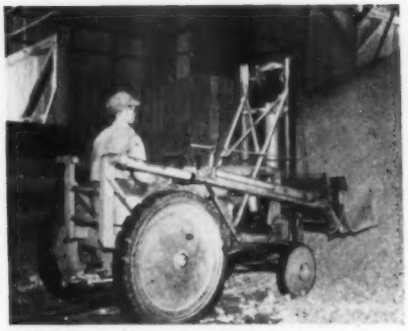
BENTONITE FOR OIL REFINERIES



Continuous-weighing device which measures clay into a turbo-mixer.



Cage mill and drying tower which form a part of the flash-drying system.



The ½-cu. yd. tractor shovel feeding raw material from the stock-pile.

line excavates the bentonite and loads it into 1½-ton dump trucks. Six Ford and Chevrolet trucks are used and these haul the material about 18 miles to Morton, where it is discharged from the trucks on ramps into railroad cars. The material is then transported via the Illinois Central Ry. to the plant, which is 3 miles southwest of Jackson on the main line of this railroad.

At the plant the clay is discharged from the cars into a track hopper from which a Webster pan-conveyor takes it at the rate of 25 tons per hr. to an inclined belt-conveyor in a concrete tunnel. A Latimer steel-inclosed bucket-elevator discharges the clay on a horizontal belt-conveyor which distributes it to a stock-pile by means of a movable tripper. This indoor stock-pile has a capacity of about 4,000 tons. The clay is reclaimed from storage to a hopper by a McCormick-Deering Model I-12 gasoline-powered solid-rubber-tired industrial tractor equipped with a ½-cu. yd. Hough hydraulic loader or shovel. This machine loads itself and carries the load an average of about 40 ft. to the hopper at the rate of about 10 tons per hr.

A pan-feeder transfers clay from the hopper to a bucket-elevator feeding a Fate-Root-Heath double-roll crusher. This machine has a smooth roll 24 in. in diameter and an 18-in.-diameter bladed roll. Flat belts drive the bladed roll 8 times as fast as the smooth roll, effectively breaking down all the lumps. A series of belt-conveyors carry the clay to the next step in the process. Untreated clay is discharged into a 40-ft. rotary drier which has a gas-fired furnace 7 ft. in diameter and 14 ft. long and uses stack draft. The material is dried by direct heat of about 1,500 deg. F. but the flame does not actually enter the drier. The bentonite from the pit has an average free-moisture content of about 40 per cent. and is dried enough to allow ready-handling at the rate of about 6 tons per hr. This material is further dried and ground before shipment.

The clay used to make the acid-treated product is discharged from the conveyors into a bucket-elevator which has a movable spout that discharges it into steel storage bins of a combined capacity of about 100 tons. From these bins an elevator feeds the dried clay into a small bin from which a Schaffer Poidometer controls the rate of feed into a turbo-mixer. In this mixer the required amount of water is added to make a slurry or clay slip, which is then passed through a series of batch treaters where sulphuric acid is added. The mixture is brought to the boiling point by steam and is held at that temperature during the treating period. The mixture is also agitated by compressed air during this process. This treatment removes several sulphides and other impurities from the slurry.

After treatment the slurry is discharged into the first of a series of six thickeners located outside the plant building. The first thickener is 40 ft. in diameter and all the others are

Pan-conveyor feeding from the track hopper to belt-conveyor.

Separator which operates in closed circuit with the grinding mills.

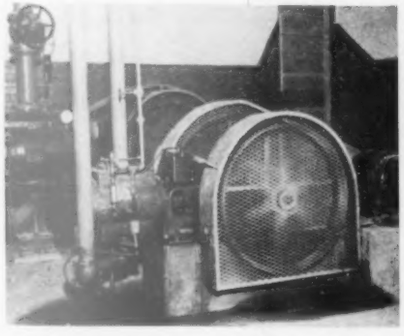
The double-roll crusher which breaks down the lumps in the raw clay.

35 ft. Near its bottom each has a blade scraper which is revolved at slow speed. The settled material from the bottom of the first thickener is transferred by a Hardinge pump into the second tank and so on through the series, each succeeding tank being at a somewhat higher level than the preceding one. The effluent, or waste water, is finally discharged into settling ponds before being allowed to flow into the river. The product of the last thickener has about 20 per cent. moisture-free solids and is pumped into an Oliver 8-ft. by 12-ft. drum-type cloth filter. The cake leaving the filter contains about 60 per cent. moisture.

The filter cake is discharged from a 16-in. belt conveyor into a paddle mixer or pug-mill from which it drops into the vertical drying tower of a Raymond flash-drying system. This consists essentially of the tower, a No. 45 flash drier or cage-mill, and a 9-ft. cyclone, in the order named. The material drops through this drying tower into the cage-mill, which has two stationary cages of round steel bars fastened to one of its side plates. Three cages of bars are fastened to the rotating plate. The free ends of these cage bars are fastened to circular steel rings for stability. This mill does little pulverizing but does additional breaking up of the cake lumps to insure even and thorough drying.

The product of the cage-mill, along with the hot air from the furnace, is drawn through a pipe into the 9-ft. cyclone. This cyclone is vented to a 22-in. by 26-in. fan which furnishes the suction for the flash-drying system. The fan discharges the hot air and fine suspended solids into 6-ft. Raymond twin concentrators which are vented to a stack. The material settled out by these concentrators is discharged back into the pipe leading to the cyclone.

The product of this cyclone drops through a Raymond 12-in. rotary valve into an 8-ft. Raymond mechanical air-separator, whose fine product is routed in several different ways. It has been found that a certain percentage of this dry dust added to the wet and sticky filter cake in the pug-mill



Two of the four compressors which supply air and vacuum requirements.

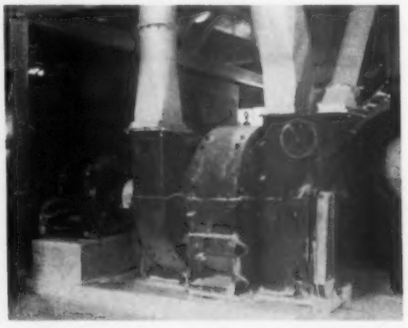
Walking dragline removing overburden and small crawler dragline loading clay.

aids materially in breaking down the cake. The remainder of the separator product is sent to storage, as will be described later.

If desired, some of the tailings from the separator can also be added to the

Product being bagged in paper by the 4-tube packing machine.

filter cake. Usually these tailings are discharged by gravity into a Raymond No. 51 Imp mill, which is also connected to a gas-fired furnace and, in addition to pulverizing the tailings to the desired fineness, dries them to about the same degree of dryness as that of the separator product. The



Mill which performs final reduction and drying.

Imp mill blows its fine product into a 5-ft. Raymond cyclone. This is vented to a 6-ft. Raymond tubular cloth-bag dust-collector which returns the collected fines to the Imp mill. The product of this cyclone is usually discharged into the mechanical separator previously mentioned but if desired, some of this material can also be mixed with the filter cake.

Another view in pit showing small crawler dragline loading clay into truck.

All the finished material is dropped into a bucket-elevator which discharges it into a bin feeding a 4-tube Bates bag-packer. The filled bags are handled manually to storage or direct into cars for shipment. Bates 50-lb., 4-wall paper bags are used. Shipments are made all over the United States and to several foreign countries.

The process water used in this plant is supplied by a Layne & Bowler, Memphis, deep-well turbine pump at the rate of 300 gal. per min. from a well 850 ft. deep. This pump is driven by a 40-hp. General Electric induction motor. Near the plant are a 95,000-gal. steel water tank and a 300-ton sulphuric-acid tank, both supplied by the Chicago Bridge & Iron Co. Steam used in the processing is supplied by two 100-hp. gas-fired fire-tube boilers. Compressed air for agitation of the slurry during the processing is furnished by two Worthington compressors and vacuum for the filter is supplied by two Worthington pumps.

The new plant was designed jointly by the engineering department of the Atlantic Refining Co. (acting on the advice of the Attapulgus Clay Co.) and the Filtrol Co. of California. It is all-steel and concrete in construction with Republic Steel Corp. U-lov corrugated sheet-metal siding and roofing and steel-sash doors and windows. The equipment in this plant is driven by individual electric motors. The bucket-elevators are driven through Philadelphia gear-reducers and most of the other equipment is driven through V-belts or gears. The Webster Mfg. Co. supplied all the conveying equipment including the pan-conveyors, belt-conveyors and bucket-elevators with the exception of one elevator. Safety was a primary

(Continued on page 66)

The dry-screening plant viewed from loading building. Tower-storage conveyors at left.

Progressive Illinois Gravel Producer Adds Washing and Storage Unit

By W. E. TRAUFFER

THE history of the Western Sand & Gravel Co. which was incorporated and started operations at Spring Valley, Ill., in March, 1908, is typical of the more progressive type of operators of plants producing aggregates. When first described in PIT AND QUARRY (Nov. 21, 1928, p. 43) this was primarily a road-gravel plant with a capacity of 125 tons per hr., of clay-bound gravel. Facilities were available for washing a small percentage of the output but these were seldom used. At that time a new Marion electric shovel had been installed and other improvements made. Early in 1931 the demand for this material for secondary road work increased to such an extent that a new crushing and dry screening plant (P. & Q., July 15, 1931, p. 16), which has a capacity of 250 tons per hr., was erected.

The year 1935 brought an increase in the demand for concrete aggregates in the territory served by this company and to meet this demand a new screening-and-washing plant with adequate storage facilities was erected in April, 1936. This new plant, with which this article is chiefly concerned, secures its material from the crushing-and-screening plant previously described and has a productive capacity of 150 tons per hr. The Kern radial system of storage is used. This system not only provides adequate and economical storage but also makes it possible to proportion material to meet any desired specifications at a moment's notice. Another important feature is the independence of production from demand and shipments and *vice versa*. A separate loading conveyor with provisions for re-rinsing the concrete aggregate was installed in April of this year. This now makes it possible to load out 250 tons per hr. of road gravel from the dry plant, and

The radial storage tower with conveyor to screen above and tunnel reclaiming conveyor below.

250 tons per hr. of concrete sand and gravel from storage simultaneously. The operations were further improved last July by the adoption of truck haulage in the pit to replace the locomotives and cars formerly used. The present demand is about equally divided between road gravel and washed sand and gravel.

The locomotive-and-car haulage system used at this plant operated very satisfactorily as long as only road gravel was produced. The height of the bank being worked was so great that very little shifting of the track was necessary. With the production of washed sand and gravel, however, there arose conditions which required more flexibility than was possible with railway haulage. The rigid state specifications requiring certain percentages of fine and coarse sands in this material make it necessary at times to add fine sand from one end of the deposit to the sand and gravel obtained from another section of the deposit which contains well-graded gravel but is in places low in fine-sand

content. The use of the more flexible truck-haulage system has made it possible to secure material from several sources simultaneously, making possible the production of torpedo sand and gravel in one operation. The floor of the pit is of such a character that a natural road-bed is available with little preparation or maintenance. An American Road Machinery Co. grader hauled by a Bates 25 tractor does this work.

At the time of the writer's visit to the plant fine sand was being excavated from the pit at a point about 800 ft. from the plant and sand and gravel at a point about 1,500 ft. away in the opposite direction. A Link-Belt

The 1¼-cu. yd. electric shovel loading gravel to truck with dual rear axle.

Feed conveyor to storage at right; tunnel reclaiming conveyor at left.

1-cu. yd. gasoline crawler drag-line was loading sand into a Ford truck with a 6-cu. yd. dump body. Sand and gravel were being loaded by a Marion 1¼-cu. yd. Type 7 electric crawler-shovel into a Ford truck with a 6-cu. yd. dump body and Grico dual rear-axle drive. An International truck chassis has just been purchased to haul a 6-cu. yd. Austin-Western steel side-dump semi-trailer equipped with pneumatic tires. This third unit will considerably increase the productive capacity. According to Glenn Sitterly, vice-president and secretary of the company, two trucks have been hauling more material than was formerly hauled by the two locomotives with three 5-cu. yd. cars. This has been done at lower fuel cost and further important savings have been made through the elimination of track shifting and maintenance.

The trucks discharge their loads into the same track hopper formerly fed by the railway cars. No major changes have been made in the road-gravel plant since it was last described. Briefly, the material is discharged from the hopper by a belt-feeder on a belt-conveyor. Clay balls are picked out by hand on a short picking conveyor and the gravel is discharged on a series of two double-deck vibrating screens which allow the removal of oversize and excess fines. Excess fine material is stock-piled by a belt-conveyor which was moved to the opposite side of the plant when the new storage tower was installed. A Thew ¾-cu. yd. shovel loads this material from the stock-pile into trucks. Oversize material coming from these screens is fed to two crushers, one of the jaw and one of the cone type, and is returned through the plant to be blended with the finished product.

The finished road gravel was and still is discharged on a 24-in. loading belt-conveyor which then discharged through spouts into cars on a single track. When the washing plant was put in operation this conveyor was also used to receive all the washed materials from the tower-storage reclaiming conveyor. This material was then discharged from the loading conveyor to a bucket-elevator which dropped it into three 50-ton steel bins for car-loading. This elevator had a capacity of only 40 tons per hr. and formed a bottle-neck in the loading out of

The 1-cu. yd. dragline loading sand into a dump truck.

washed sand and gravel. Now, with a separate loading conveyor for the washed material, this elevator has been eliminated. The road-gravel loading conveyor now handles road gravel almost exclusively and has been extended 10 ft. to a length of 228 ft. to allow alternate loading into cars on two tracks, eliminating the former delay when moving cars. The second track was put in this spring by the C. B. & Q. Ry. which serves this plant. Both tracks are on such a grade that cars can be moved to and from the loading point by gravity. Each track has space for 15 empty cars above and 15 loaded cars below the loading point.

Sand and gravel for the washing plant are obtained from the dry plant by means of a flop gate in the chute feeding the road-gravel loading conveyor. Any desired sizes can be diverted for this purpose but the demand is usually for material from 2-in. down. A 24-in. Barber-Greene in-

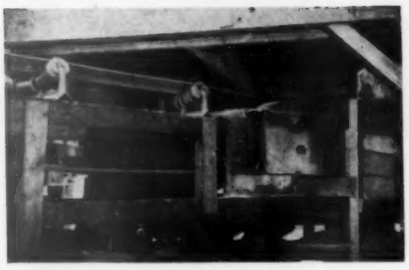
Car-loading arrangement with dry plant in right background. The three storage tanks are used for washed sand and gravel.

clined belt-conveyor 162 ft. long, supported on a steel-truss framework supplied by the same company, carries this material to the top of the washed-gravel plant. This conveyor operates at a speed of 250 ft. per min. and discharges the material into a 36-in. by 18-ft. sluice box, where water is added to soften and soak the material to facilitate washing out the clay. This box is made of Ryerson abrasion-resisting steel.

The automatic backstop on the washed-material loading conveyor.

The box discharges the material on a 42-in. by 16-ft. Symons triple-deck screen which is equipped with Chain-Belt Rex spray nozzles and is so arranged that six separate sizes of material are produced. The first 10 ft. of the top deck has ½-in. wire cloth and the last 6 ft. has 1½-in. cloth. Below the ½-in. section on the second and third decks are 10-ft. sections of 5-16-in. and 3-16 in. cloth respectively. Under the 1½-in. section but separated from the 10-ft. sections on the second and third decks, are 6-ft. sections with 1-in. and ¾-in. cloth, respectively. The six sizes produced are: 1½-in. plus retained on the top deck; 1-in. to 1½-in. retained on the second 6-ft. section; ¾-in. to 1-in. retained on the third 6-ft. section; ½-in. to ¾-in. passing through the third 6-ft. section; 3-16-in. to ½ in. retained on the second and third 10-ft. sections and combined; 3-16-in. minus passing through the third 10-ft. section. The five coarse or gravel sizes are discharged through chutes direct to separate storage compartments.

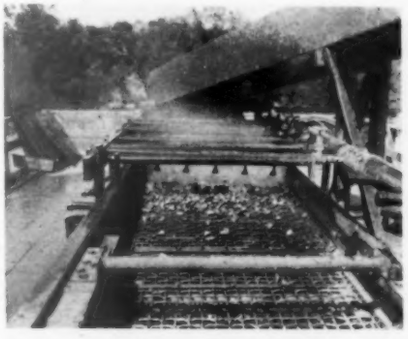
Another view of radial storage system with dry plant at right.



Chain-type reducer drive on the tunnel-reclaiming belt conveyor.

The minus 3-16-in. material is sand and is discharged into a 19-ft. Link-Belt double-screw washer with an especially large box which is flared outward near the top to give a larger settling area, allowing the greatest possible amount of extremely fine material to be settled out. This washer was installed in March of this year to replace the tank-type classifier formerly used.

The Kern 6-compartment radial-storage system on which the above screen and washer are mounted has been used almost entirely for live storage as the demand has been too great to allow any building up of storage. What little rehandling to dead storage has been possible has been done with a crawler crane. A 1-cu. yd. Sauerman Crescent scraper is on hand ready to be installed and a new type of Kern traveling head tower with a 2-drum



The 42-in. by 16-ft. 3-deck screen used for washed gravel sizing.

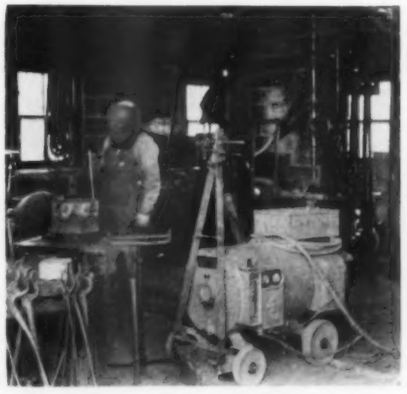
hoist will operate the scraper. This 20-ft. head tower will be made of steel with the front end mounted on flanged wheels to run on a single-rail track of 125-ft. radius. The rear end of this tower will be mounted on four pneumatic-tired wheels. With this rehandling system installed a storage capacity of 100,000 tons will be available.

As it is now being used this storage system has a total live loading capacity of 1,200 tons in its 6 compartments. The various sizes of gravel and the sand are discharged from storage through arc gates and drop chutes on a belt-conveyor in a concrete tunnel under the storage structure. Each gate has been marked with notches so that the degree of opening can be quickly adjusted for any desired mixes. When once the adjustments for a mix are determined, it is only necessary to raise or lower the drop chutes by means of extension rods operated from the washer floor. This arrangement makes it possible for one man to control this entire storage and loading system and to start or stop the loading operations from above. By this method of proportioning the various gradations of sizes in washed gravel can be controlled to within one or two per cent.

The Barber-Greene tunnel reclaiming conveyor is 24-in. wide and 162-ft. long, and is inclined only for part of its length. Material is ordinarily discharged from this conveyor on the new Barber-Greene 18-in. by 180-ft. inclined washed-material loading conveyor. As an option in case this loading conveyor should ever be inoperative the tunnel conveyor can discharge on the road-gravel loading conveyor. This option would also be an advantage if it should ever be desired to store road gravel.

The dual rear axle truck discharging load to plant feed hopper.

The new loading conveyor is a Barber-Greene unit mounted on steel trusses and is operated at a speed of 300 ft. per min. It discharges the



Electric arc welder in shop being used for equipment repairs.

washed gravel on a new 42-in. by 10-ft. Symons single-deck screen which is equipped with 3-16-in. wire cloth and Rex spray nozzles. This screen gives the gravel a final rinse before it is discharged into one of the two-50-ton steel tanks used for car-loading the gravel. The fine material and water passing through this screen are discharged into a Telsmith settling tank from which the sand is discharged into the third tank, which is used for loading sand into trucks. When sand is being loaded from the storage system for truck loading, the screen is by-passed and the sand is discharged directly into the loading bin. When sand is being loaded out of the storage system for car-loading, it is loaded directly from the tunnel conveyor to the 24-in. road-gravel conveyor and direct to railroad cars.

The three conveyors serving the Kern storage system were supplied by the Barber-Greene Co. and the conveyor belting by the B. F. Goodrich Co. Each of the two inclined conveyors has a Barber-Greene automatic backstop to prevent reversing under load in case of power failure and each is driven through a Barber-Greene chain-type reducer.

A complete machine and repair shop is maintained at the plant. The most recent addition to the equipment in this shop is a P. & H.-Hansen Smootharc arc-welder. This machine was used in the construction of the new plant additions and is now used to repair and maintain existing equipment, rebuild worn parts, etc. A small tank-mounted compressor supplied by the U. S. Air Compressor Co. furnishes air for the operation of other shop equipment. Practically all the screen cloth used in this plant is supplied by the National Wire Cloth Co.

Filtrol

(*from page 62*)

consideration in building this plant and all the moving equipment is either inclosed or protected by guard rails. All the machinery drives are inclosed in heavy steel mesh guards.

The general office of the Filtrol Corp. is at Los Angeles. The company's officers are: L. L. Robinson, chairman of the board of directors; L. R. Streander, president. Mr. Robinson is also president of the Filtrol Co. of California. J. W. Bell, formerly production manager of the Filtrol Co. of California was an advisor in the construction of the new Jackson plant and is now manager of manufacturing for both the Los Angeles and Jackson plants. H. C. Sidener is manager of the Jackson plant. L. R. Streander is president and C. M. Shaeffer is vice-president and general manager of the Attapulgus Clay Co.

Vermiculite Sales Growing Rapidly

Vermiculite, a drab-looking mineral that opens up like an accordion or swells like moistened sponge when heated, was virtually unknown commercially a few years ago; but in 1936, according to reports of producers to the Bureau of Mines, sales exceeded 17,000 tons worth $185,000 at the mines. By the time the processed and bagged material reached the ultimate consumer its value was enhanced to around $75 a ton, consequently the industry's sales actually exceeded $1,000,000 for the year. Production was speeded up in anticipation of trebling the sales in 1937.

The principal use of this interesting material is for insulating dwellings, to retain the heat in winter and keep it out in summer. In the form of loose fill for this purpose it competes with mineral wool, another mineral whose use has expanded by leaps and bounds during the last five years. Vermiculite had been known to mineralogists for more than a century, and even its name, which comes from the Latin *vermiculari* meaning *to breed worms*, indicated its property of unfolding into wormlike forms when heated; nevertheless no use was made of this fact except perhaps by the Japanese, who amused themselves by throwing it on hot coals occasionally to see it exfoliate. After expansion the commercial product is lighter than cork, weighing as little as 6 pounds per cubic foot. The great bulkiness of the expanded product is the secret of its utility for insulating against heat and sound but it is also a handicap to cheap transportation. As one engineer remarked facetiously "A car will not hold a carload", and inasmuch as half a continent separates the mines from the densely-settled consuming areas, the freight rates are relatively high. To obviate this difficulty, expanding plants are being established in various cities so that the product can be shipped practically all the way in the raw state before it becomes too bulky to handle economically.

Two companies operating on opposite ends of a large deposit near Libby, Mont., have so far furnished the bulk of the output, but there are two or three producers in Colorado, two in North Carolina, and at least one in Wyoming. Deposits have been found in other States, but occurrences of high-grade vermiculite are far less common than was generally supposed, even a year or two ago. Most of the North Carolina vermiculites, in fact, tend to fly apart when heated and after expanding are too friable to be used conveniently for house fill, but they are used to an increasing extent for molded insulation, apparently taking a bond better than the corklite product. However, tests on material from the southeastern states indicate that the exfoliated material is tougher if the heating is stopped before all the combined moisture is removed. Most of the North Carolina and Georgia vermiculites become structurally weak when heated between 1,200° and 1,550°. Rapid cooling after exfoliation also seems to toughen the particles.

In addition to its use for insulating homes, vermiculite is finding important industrial uses. A wide variety of vermiculite plasters and concrete for both sound and heat insulation is available, and in various forms vermiculite is used for insulating open-hearth steel furnaces. Some automobile makers buy screenings (under 60-mesh) for making plastic insulation. Vermiculite is used in household refrigeration and for insulating commercial ice plants. It may be employed as an insecticide carrier, in lubricants, as a filler in a variety of industries, and for wallpaper printing. Potentially important is its use as an extender in paints as well as for gold and bronze printing inks.

Gypsum Industry Shows Improvement

General improvement in the gypsum industry in 1936 is shown by preliminary returns to the U. S. Bureau of Mines from producers, which indicate a gain in production of 42 per cent. over 1935. This was the third and largest annual rise since the depression low of 1933. Increases in sales were shown by the entire list of products, remarkable gains occurring in sales of plasterboard and lath, Keene's cement, and partition tile, which exceeded amounts in the previous year by 82, 74, and 71 per cent., respectively.

The employment situation in the gypsum industry also improved considerably in 1936. Preliminary data indicate not only an increase in the average number of days mines and mills operated, but an appreciable gain in the number of men employed.

Aerial view of the new kraft-board plant of the West Pirginia Pulp & Paper Co. near Charleston, S. C. The two rotary lime kilns and their stack are visible in the left background.

LIME PRODUCTION AT A NEW PAPER MILL

THE widespread and rapid industrial development which has been taking place in the southern states during the past few years is almost without a parallel in the history of this country and as yet there are no signs of a slackening in the rate of expansion. This development embraces many of the major industries, including iron and steel, textiles, petroleum and gas, chemicals, paper, lumber, etc. Many of the vast natural resources of the South are now being actively developed for the first time.

Leading in this expansion is the kraft-paper industry which has inaugurated a building program involving the expenditure of over $60,000,000. Late in 1935 construction of the first of 10 huge new kraft pulp, paper and linerboard plants was begun. Several of these plants are now in operation, a number of others will be completed this year, and additional plants are contemplated. Largely through the work of Dr. Charles H. Herty, director of the Savannah Pulp and Paper Laboratory, Savannah, Ga., a method has been developed for the manufacture of newsprint and other white paper from southern pine and several new plants to use this process are planned. This will mean a further expansion of the paper industry in this section, whose vast potentialities can not yet be estimated.

The paper industry in this country was originally centered near the vast northern forests, but cutting has badly thinned this source of supply as well as the Canadian forests, which have been supplying an increasing quantity of pulp and paper in recent years. The slow growth of this northern pine has resulted in a depleted supply. About $170,000,000 is now spent annually by this country for pulp and paper imported from Canada and foreign countries. Importations in recent years have totaled over 1,000,000 tons of sulphite pulp and 2,000,000 tons of newsprint annually.

The South has vast resources of young, fast-growing, second-growth yellow or "loblolly" pine and all the necessary chemicals are economically available for the development of the paper industry. The southern forests were at one time almost entirely worked out by sawmill operators, but strict fire and forestry control has restored a large part of the original resources. It is estimated that there are over 100,000,000 acres of this timber now available.

A large kraft-board plant is now being completed by the West Virginia Pulp & Paper Co. near Charleston, S. C. This plant is designed to produce 300 tons daily of kraft linerboard for box manufacture and represents an investment of about $7,000,000. Construc-

Another view of the new kraft-board plant with rotary lime kilns and stack at extreme left.

The lime kilns and work being done on oyster-shell handling equipment.

The kilns and stack viewed from discharge end. Some of treating tanks at right.

Unloading oyster shell from barges to trucks which haul to lime plant.

tion was begun in November, 1936 and the plant is expected to be in operation about July 1, 1937. This project includes a modern rotary-kiln lime plant which will produce the lime required in the process from oyster shell.

This company also operates pulp and paper mills at Tyrone and Williamsburg, Pa., Mechanicsville, N. Y., Luke, Md., and Covington, Va. The process quicklime used in these plants is purchased from commercial-lime producers except that at Covington, where the company operates a plant to calcine limestone, only a part of the lime required is purchased.

In these paper plants soda or "cooking liquor" is used in the paper-making process to digest the wood chips, dissolving all except the cellular or fibrous material out of the wood. Quicklime is used to cauticize the recovered soda after use in the process so that it can be used over and over again as cooking liquor. The spent lime is then separated from the soda and recalcined for re-use. This process is repeated over and over again. The recalcining is done in two rotary kilns at the new Charleston plant and these kilns also calcine fresh lime from oyster shell to replace the lime lost in the paper-making process. TheWest Virginia Pulp & Paper Co. has been reclaiming and reusing process lime in its plants for the past 14 years. Formerly lime was thrown out after being used only once and fresh lime was used for each batch of cooking liquor.

At this plant the liquor used in cooking the pulp, containing soda and sulphur, combined with lignine (that part of the wood not suitable for pulp), is first evaporated. Next, the lignine is burned, and the soda salts reduced to a condition where they can be dissolved out as sodium carbonate and sulphide. This solution is known as "green liquor". It is next clarified in a Dorr settler, removing the dregs, to be washed for further soda.

The clarified liquor is next combined with caustic lime, carrying out a "mass reaction," wherein the soda exchanges with the calcium, which is precipitated as calcium carbonate. This calcium carbonate is removed in another Dorr settler.

The caustic-soda solution resulting from the above reaction is decanted, sent to storage, and used for cooking further chips. The calcium-carbonate sludge is drawn off over a classifier, removing the large lumps, and then passes to two Impco filters in series, where the remaining soda salts are washed out. The liquor and wash-water from the washings go to storage, and are used for bringing the newly-causticized liquor to the right strength for cooking.

The cake from the last two filters has a moisture content of from 43 to 45 per cent. and is fed by screw-conveyors into the kilns. The two Traylor rotary kilns are 8½ ft. in diameter and 170 ft. long, and are all-electric-welded. These kilns are of standard design, are lined, and are oil-fired. The cake recalcined in these kilns contains about 85 per cent. CaO. As a 90-per cent. content is to be maintained lime produced from oyster shell will be added from one of the kilns to maintain this level.

The oyster shell is dredged from the reefs which abound along the South Carolina coast. Barge-loads of the shell are unloaded by crawler cranes at the plant dock and motor trucks haul the shell to the lime plant.

Corning Builds Glass Wool Plant

Vibrating the concrete in a pavement as it is laid increases the strength 10 per cent. according to a report by the Bureau of Public Roads of the U. S. Department of Agriculture or, by vibrating, 10 per cent. less cement can be used, and the same strength maintained.

The report gives the results of an investigation recently conducted at Arlington, Virginia. Two hundred and seventy slabs of pavement, each 10 feet wide and 8 feet long, were constructed and tested. Four different types of vibrating equipment were used, their speeds varying from 3,600 to 4,000 revolutions per minute.

Slabs of similar composition were placed and finished by standard methods without vibration. Thus, differences in the strengths and physical properties were directly attributable to vibration. In each instance it was found that vibration increased the strength and density and decreased the amount of "honeycomb", or air pockets.

To investigate the effects of vibration further, the quantities of aggregates, cement, and water were varied in slabs finished by the vibration method, and their properties were compared with those of nonvibrated slabs. Slabs 7 and 10 in. thick were placed, and the effects of surface vibration were found to extend entirely through both.

By ARNOLD KRUCKMAN

News and Views from the Capital

OVER sixty different bills have been offered to the Congress since January as legislation to impose minimum wages and maximum hours upon industry, and to control child labor, unfair labor practices, and to regulate all trade practices broadly affecting labor. All these bills fix 5 days as a working week; most of them make 8 hr. a working day, although a not inconsiderable proportion make 6 hr. the daily maximum for work hours. All bills that mentioned a figure fixed $16 as a weekly wage minimum. And 16 years apparently is regarded by the lawmakers as the age below which childeren should not be allowed to labor. In some cases 16 was made the age limit for boys and 18 for girls. Generally members of the Congress strove to make the law effective by prohibiting shipment of goods out of the state where employers pay less than the minimum and work their employees more than the maximum, or use the services of children. Some bills would prohibit such shipments into states maintaining Federal labor standards.

The various bills were offered by Senators O'Mahoney (Wyo.), Wheeler (Mont.), Schwellenbach (Wash.), Capper (Kan.), Barkley (Ky.), Bankhead and Black (Ala.), Nye (N. D.), King (Utah), Clark (Mo.), Borah (Ida.), Burke (Neb.), Walsh (Mass.), Townsend (Dela.) and Tydings (Md.), and by Representatives Voorhis, Lea, and Ford (Cal.), Kvale (Minn.), Millard, Fish, Culkin and Mead (N. Y.), Harlan and Lamneck (O.), Lewis (Md.), Sauthoff and Cannon (Wis.), Martin (Colo.), Faddis, Dunn and Ellenbogen (Pa.), Connery, Rogers and Wigglesworth (Mass.), Rees (Kan.), Smith (Va.), Burdick (N. D.), Boykin (Ala.), McFarlane (Tex.), and others.

It is reasonable to assume that this summary reflects the attitude of a large number of the members of the Congress to the labor bill sent to the Capitol by the President. But only a few of the people on the hill have apparently tackled the job of planning the legislation thoroughly and comprehensively. Senator O'Mahoney has insistently driven forward with the hearings on his bill, which provides for licensing by the Federal Trade Commission of corporations engaged in interstate and foreign commerce, and directs the commission to co-ordinate, stabilize and develop basic industries, and to organize a more equitable distribution of the earnings of commerce. To be licensed, corporations must comply with minimum-wage scales, maximum-hour schedules, anti-child labor laws, all national labor-relations laws; and provide workers *with additional participation in the benefits* that might come to industry.

However, the court fight threw Senator O'Mahoney into the anti-administration camp, and it became increasingly clear that his bill would have no opportunity to secure the President's approval. In the meantime Senator Wheeler and Representative Lea had evolved a plan based upon the legislation proposed by Siegfried Hartman. As it was finally drafted it made unlawful all forms of deception of the public whether or not affecting competition, all competition at any time legally construed to be "unfair", and any other practices generally defined as contrary to existing standards of fairness. In addition to the regulation of price discrimination and other trade practices the Federal Trade Commission would administer trade-practice conferences which would adopt wage and hour and child-labor and other labor-practice regulations, "voluntarily" within each trade group, and after such adoption by the group the standards thus set up from within would become binding and could be enforced by the Federal Trade Commission through the courts. It was the purpose to regulate labor practices by regulating the effects of wages and working conditions as reflected in interstate commerce. This would save the Congress the need of making direct regulatory laws the legality of which bothered many members who sincerely wish to do something to "advance the frontiers of social progress".

It was assumed on the hill that this bill would find favor at the White House because it seemed to fit into the avowed administration plan to integrate groups of industrial units into monopolies under the guidance, protection and control of a government monopoly, as outlined by Secretary Wallace in an unpublished address delivered on April 3 at the University of North Carolina. In this address Wallace likewise disclosed that it was the purpose of the administration eventually to sponsor a plan to tax every individual and every association, and to increase taxation as the national income rises, thus checking frozen savings which could not go into new plants, plant expansion and new businesses, but would be spent by the government on projects without durable goods and spread widely among those with the lowest incomes.

The Wheeler version of this bill passed the Senate. The Lea version was favorably reported by the subcommittee of the House Interstate Commerce Committee and was ready to go before the House with the recommendation of the full committee, when word came from the White House to hold it. The Congress as a whole liked the essence of the Lea-Wheeler bill and was ready to pass it with a rush. There was a feeling in the air that something had to be done.

Seventy-two hours later the President's message and bill came to the Capitol. The original so-called Connery-Black bill came from the White House as a rough draft. It was altered, amended, modified, night and day, even until within a few minutes before it was presented in the House and the Senate. The last corrections were interlined in pencil after a hasty telephone consultation between Mr. Connery and Senator Black. The haste was so great that Connery missed some of the phrases and eliminations.

The bill, according to those best informed, was drafted by Ben Cohen and Tom Corcoran, the President's intimate unofficial advisors on New Deal legislation. Both have obscure jobs in different government agencies. The bill is supposed to have gone through Donald Richberg's hands, and through the hands of Assistant Commerce Secretary Ernest C. Draper, for the time one of the President's confidants. The word is that Mrs. Perkins, the labor secretary, was not consulted, and that Attorney-General Cummings was shown the document after it was written.

What will happen to the attorney-general's suggestion about the commission to study wages, hours, patents, industry, laws, trade-practices, labor-relations, and monopolies no one seems to know. Nor does any one have a clear idea about the destiny of the National Labor Relations Board, if the President's wage-hour-labor-practices

bill is made law. The functions of the new board would apparently cancel or duplicate the functions of this present agency. Officials of the NLRB themselves are at sea.

Mrs. Perkins apparently does not accept the new labor bill as the last word. She told a Congressional committee that she will continue to work to bring together the units of the steel and automobile industries to function as benevolent monopolies under the paternalistic supervision of Uncle Sam after the pattern of the combination of the Textile Industry as planned in the Ellenbogen bill, which, in turn, is modelled upon the soft-coal government monopoly created by the Guffey-Vinson Act.

Nor do the labor unionists apparently accept the President's bill as a satisfactory instrument. The word is "apparently". They profess to be dissatisfied with the minimum-wage scale and with the maximum-hours schedule. It is expected they will make a great show of objections before the Joint House-Senate Committee hearing. But behind the scenes it is sensed they will wage a strenuous campaign for the adoption of the bill, exactly as written.

In their inner circles the labor organizations look to the bill to give them a dominant control in all business and industry. Labor leaders are convinced that when a union, under the proposed law, makes separate wage-and-hour bargains with various units of an industrial group, the maximum-wage scale and minimum work-schedule and most advantageous labor-practices arranged with one unit of the group automatically becomes the standard to which all units in that industry must conform. They emphasize that the proposed act does not prevent any union from bargaining for more wages and shorter hours than the proposed law may fix as minima and maxima. And if state laws provide more advantageous minima or maxima than the Federal laws, state laws will supersede the Federal law, because any state may bar products made or sold under standards less advantageous to labor than those fixed by state statutes.

Labor leaders point out that the proposed law is the first that has teeth. Every time the employer works a man "off standard" the employer may be fined $500 and imprisoned six months; and he is liable to similar punishment every week that his records of pay-rolls, hours, etc., do not conform to legal requirements. And when he is convicted of discharging or otherwise interfering with an employee for making complaint, or giving testimony, or assuming that the employee plans to take such action, the employer must pay a $1,000 fine and serve one year in a Federal penitentiary. Labor is particularly happy over the provision that allows an employee to assign a wage claim to the proposed Labor Standards Board. The board will proceed to collect any amount legally due, in addition to what may have been paid and what may be due, according to standards set up for the industry, including time and one-half overtime wages for each hour exacted above the legal work schedule. Labor also points to the section which declares that when it can be proved any solitary single employee has been worked "off standard", not only the unit by which he is employed, but the whole industry may be legally penalized.

The Congress is confused by the surface conflicts and by the "half-baked" aspect of some of the plans thrust upon it for enactment into law. In the cloak-rooms you may hear officials of government agencies mainly concerned with labor and industrial problems airily characterize the bill as merely a stone thrown out to stir up something. The most common comment among members of the Congress is the suggestion that the bill is designed to place in the hands of the new board the colossal task of codifying labor standards, including the definition of wage differentials created by varying geographical conditions. They point out, for instance, that climate in one section prevents workers from doing as much labor as is done by workers in another; and that some industries are in such a state of depression that they can not stand a jump in wages or a cut in hours; and that local influences, like varying living costs, have a decisive effect upon labor conditions. It is the common thought that the plan is vague and immature, that it was drafted without a basis of sufficient wage data, and that it reflects no serious effort to bring this labor plan into accord with the unemployment-insurance and r e l i e f programs. If cloak-room sentiment is a sound barometer of what the Congress will do officially, it seems questionable if this bill in its present form will be made law. The Congress is sensitive to the unanimous dictum of the Supreme Court that the legislative branch has no authority to delegate a "roving commission" to any Federal agency. Also the Congress is very conscious of the challenge, in the President's message, to the Supreme Court. It will still be the business of the Supreme Court to determine if a government board may bar from interstate commerce products that were made under conditions beyond its control. And the court undoubtedly must determine if goods made within a state by workers who are willing to take lower wages and work longer hours may be stopped from circulating in interstate commerce. Incidentally, all this brings back into Congressional consciousness the President's urgency to pass the court-reorganization bill w i t h o u t compromise. Apparently he will need an assured partisan margin in the court to secure a favorable decision upon the various doubtful phases of this bill.

The aspect of the proposed law that has caused the gravest informal discussions among members of the Congress is the provision that if an industry or a business carries on commerce with manufactured materials or services that do not conform to the Federal interstate-commerce labor-practices as defined in the proposed act, those services or that merchandise are prohibited from circulating among the states. This commerce may be legal in its own individual state, but it is shut out from all other states and from foreign commerce. The prohibition applies to commerce not in accord with the numerous labor-practice regulations as well as the wage and hour maxima and minima. It even applies to intrastate trade if the commerce is interpreted to stand in the way of "the flow of interstate commerce."

That means that if A sells a product made wholly in the state which competes with an article B has secured from interstate commerce, A is amenable to Federal control, although he makes his goods wholly within the state and sells them only within the state. Moreover, say some Congressmen, the proposed law will assuredly form the basis upon which the Federal T r a d e Commission may prosecute those who do not conform for practicing trade unfairly, thus violating the Clayton Act, the Federal Trade Commission Act, and the Robinson-Patman Act. And it is pointed out that if this bill becomes law the Labor Standards Board may use the full power of the Federal government to prevent any offending business or industry from shipping beyond the confines of its own state, which, literally means the Federal government may punish the offender by wiping him out, destroying his business by a simple order.

The Congress feels that this administration was placed in power with a mandate to legislate labor standards. The calendar abundantly reveals that the Congress is conscious of the mandate. It particularly feels the pressure

for the need of anti-child labor laws, for the abolition of sweatshop hours and wages. But it also feels that the proposed labor law comes perilously close to jeopardizing the existence of all business and industry in the United States under the economic system that has hitherto prevailed. Some Democratic members of the Congress feel that if the proposed law is enacted as written it will act to nationalize business and industry.

This 75th Congress earnestly seeks facts, truth, and light. It will welcome counsel, information, data from any sincere and responsible source. With due allowance for the human equation, it may be confidently assumed that the Congress will go into this problem with less partisan bias than has been present in almost any other discussion since this administration came into power. And it will probably be less responsive to administration pressure than it has been in connection with almost any other legislative program. There is every sign that Congressional independence will be essentially marked in this incident.

It is almost needless to suggest that this is an opportunity for the individual representatives of industry to come to the aid of their friends in the Congress. Sincere persons with real ideas will be more than welcomed at the hearings or in private conferences. Of course the official representatives of trade organizations will find ready reception by members of the Congress who always are glad to have their trained and competent assistance. But this seems to be one time when the personal interest of the men and women who are at the helm of industry will have particular weight with the legislators.

If the decision lay with the Congress it seems certain that the surtax on undistributed corporation profits would either be repealed or drastically modified. The drawback lies with the Treasury. Ever since the White House launched its economy drive and tax receipts fell so startlingly short of official estimates Treasury officials have been set in their opposition to any modification of existing tax laws or even changes in minor details. As of course is proper, any suggested legislation is always discussed with the department which administers the law. It is this hurdle that the Congressional committees can not surmount at present, and, in addition, the President has let it be known that the Treasury is making a survey of the whole tax field to enable him to submit a specific plan of revision when the Congress reconvenes next year. Incidentally, since it is an open secret that the President plans to put the burden of an increase upon all the voters of lower income from whom the bulk of votes come, the Congress is rather "jittery", because one-third of the Senators and all the Representatives must fight for re-election next year.

Members of the Congress frankly wanted $150,000,000 for roads, $300,000,000 for PWA projects, and $55,000,00 for flood-control works. They proclaim that they wish to allocate their own regional patronage instead of submitting to the program made for them by the White House and Mr. Farley. Washington interprets this to mean that the people back home are unmistakably aiding and abetting this demonstration of independence, and that it constitutes a strong hint that members of the Congress are more than ready to re-establish the *cordiale entente* with business and business men.

It is significant that it was a Democratic Congressman who informally pointed out that there is a joker in the amendments offered to the Walsh-Healey Act. The joker is the provision that requires minimum wages be fixed at any prevailing average regardless of the differences caused by geographical locations. For instance, southern Senators and Representatives say that in a region where wages are logically low the mean would be fixed at the country-wide minium, and in turn the national average would be hoisted with the result that the minimum wage would go up again.

The Labor Department has drafted a minimum-wage and labor-practices bill for women and minors which is available as a model for enactment in any state. It has been adopted in eight states and is being promoted by labor leaders in many others. Fifty or more voters may petition that its Director investigate any trade, industry or business to discover if women or minors are receiving inadequate pay and oppressive treatment. The Director may appoint a board of three employees, three employers and three disinterested persons to make the act effective. The board may set a minimum-wage scale, define working condtions, and impose penalties; and the Director can issue mandates, and publish the names of employers who violate the orders; newspapers and radio stations are absolved from damage suits in making such announcements. In essence the law also is to apply to men workers.

Within thirty days after the Supreme Court decision the National Labor Relations Board received 1,009 charges of unfair labor practices and petitions to name collective-bargaining unions, constituting 43 per cent of all charges filed during the preceding twenty months. The increase in appeals for collective-bargaining elections exceeded by 1,000 per cent. the previous monthly average. In the case of the Marathon Electric Mfg. Corp., Wausau, Wis., the board ordered 33 employees restored to their jobs with full seniority rights, and caused the corporation to pay the employees a total of more than $18,000 in satisfaction of lost wages. The case had dragged since December, 1935, when the workers were discharged because of their affiliation with the International Assn. of Machinists.

The trial of the Robinson-Patman Act charges against the U. S. Tile Quarry Co. was delayed during the past month by reason of the fact that the Federal Trade Commission examiner was engaged in another Robinson-Patman Act hearing. It is expected that the defendants will be heard during June. Attorney Newell W. Ellison, of the defense staff, feels that the government has not made a case.

Senator Logan's bill, S. R. 1686, providing for a complete overhauling of the present system of Federal contracts, now in the Senate Judiciary Committee, would repeal the law which requires a separate surety bond for materials and labor. The bill may be reported out of the committee in the near future. Various trade organizations are marshalling opposition on account of the elimination of the separate surety bond for materials.

H. R. 146, Representative Griswold (Ind.), requiring contractors bidding on Federal projects to name in advance the subcontractors, material men, and supply men, was passed by the House, and is now ready to be reported out of the Senate Committee on Public Buildings and Grounds. It is designed to put a stop to bid peddling, and will become law unless there is organized opposition.

It is taken for granted on the "hill" that the opposition of the Interstate Commerce Commission has killed the Pettengill Short and Long-Haul Bill.

Official Washington holds that the Supreme Court decision validating Louisiana's chain-store tax increases general government control of trade practices, making legal the promotion of fair competitive conditions and the equalization of economic advantages. It is interpreted to mean that the Congress can regulate trade practices, eliminate price discriminations, impose price uniformity, etc., after the principle involved in the O'Mahoney Federal licensing bill.

(Continued on page 74)

Road built of trass-Portland cement in the town of Eifel.

Some Observations Regarding Modern Highway Construction

By FRED A. FINKELDEY
Member, American Concrete Institute

A LONG time ago an Englishman coined the expression that the state of civilization of a nation could be measured by its use of soap. Taking account of present-day conditions I wish to add a new criterion with the declaration: "The state of civilization of a nation can be measured by the condition of its highway system."

The development of road construction is as old as civilization itself, even though the progress of the two has not always proceeded at the same tempo. The rapid development of railway traffic in the nineteenth century drew a large, perhaps the greater, part of the passenger and freight traffic from the highways and led at times to the neglect of highway construction and of road maintenance. The invention of the automobile and its introduction into the transportation of persons and freight, especially for long-distance traffic, changed this picture rapidly and thoroughly. The highway came back into importance, but of course had to adapt itself to the new vehicle, the motor vehicle, and new construction methods for highway construction came to be employed.

First and foremost the old highways had to be widened, sharp curves in the roads were straightened, the load-carrying capacity of the highway surface had to be increased and its resistance to wear improved. The old water-bound broken-stone road could no longer meet the new requirements. Also, an entirely new problem arose, that of fighting dust. The masses of dust whirled up by fast-moving motor vehicles not only constituted a public nuisance, but were also extremely objectionable on sanitary considerations. The road-building engineer saw himself confronted with a whole series of new problems, for the solution of which he could rely on no earlier experiences, he had to create something new from the ground up.

It was especially the road-building materials which had to be adapted to the new requirements. After years of experimenting with new methods and materials the laborious work of the highway engineer was rewarded by success. The modern and dust-free concrete highway was built and with its inception and its rapid further development, motor vehicle traffic grew at a rate which constantly made necessary a further extension and further development of the highway system.

A competition between the road and the motor vehicle set in and is still going on at full pace and without a sign of wearying or even of pause. The United States, or rather its industries, lead in this world-wide competition.

The concrete road will, so far as human reckoning can foretell, be the highway of the future, even though we do not wish to hide from ourselves the fact that many faults still attach to it. The concrete road in its present-day condition has advantages and disadvantages. As advantages they may be mentioned:

1. The concrete road is, when well built, durable under heavy traffic.
2. The concrete road is dust-free.
3. The concrete road has a good appearance and beautifies the city and rural landscape.
4. The concrete road is easy to keep clean.
5. The concrete road requires, when well built, lower maintenance costs than roads of other construction.
6. The concrete road offers less friction resistance to traffic and thereby lowers the operating costs of the motor vehicle.
7. The concrete road affords the traveler better sight during the darkness.

Not all concrete roads have these advantages; it is consequently necessary in connection with the construction of a concrete road to observe all the precautionary measures and principles which apply generally to concrete structures with high requirements. (Compare the article, *A Lesson in Building from Ancient Rome*, P & Q, November, 1936, pp. 53-54.)

Particular care is to be exercised in the selection and in the preparation

Highway built with pozzuolan-lime cement near Bremen.

of the subsoil for the new construction of a concrete road; the subsoil must be uniform and have a good load-carrying capacity. In the case of freshly-filled ground, in addition to the crushed-stone packing course and rolling work reinforcing steel should be embedded in the concrete course in one or two layers. This process is not unknown in road construction in the United States and consequently re-

Laying reinforcing on a road job in Anhalt, Germany.

quires no further explanation at this place. The reinforcing-steel web has two objects to fulfill in road construction:

1. It takes up the traffic loads of the road in cases where settlings in the subsoil and therewith possibly destruction of the concrete surfacing are to be feared.

2. It takes up temperature and shrinkage stresses and is therefore also employed with good success where the subsoil in itself is satisfactory.

If the road leads through lowlands with high ground-water table, then in colder regions the damaging of the road by frost is to be reckoned with. In such cases drainage channels should be laid along the road for the constant collection and carrying off of the water which gathers under the roadbed.

The bed of the drainage channel must lie at least 2 ft. lower than the lower edge of the concrete road slab in order to prevent damming up and back flow of the water under the concrete bed.

The concrete road has also, as has already been mentioned, its disadvantages, which we should not overlook; it is rather the further task of the road builder to reduce and ultimately entirely to eliminate the disadvantages. These disadvantages are principally the following:

1. The frequently-occurring formation of cracks in the concrete road slab, which, if not constantly kept under control and repair, can lead to the rapid destruction of the road.

2. The so-called expansion joints which are inserted lengthwise and transversely in the concrete slab in order to avoid the formation of cracks, but only seldom have the desired result, often even constitute the first cause of the destruction of the road.

3. Low resistance to the action of frost as a consequence of the permeability of concrete to water, which allows the formation of ice with the expansion and consequent weakening of the concrete.

4. Slipperiness of the concrete surface in rainy weather, by reason of which many automobile accidents have already been caused.

In spite of the good achievements, well worthy of recognition of the highway engineer in the past, he is thus still confronted with a number of problems for solution. Will he solve them? The affirmative or negative in this case depends less on the capability of the highway engineer than on the good-will of the material-supplying industries.

Cement is the most important component in the concrete as the binder for the aggregates to be employed. On its quality, therefore, depends the fate of a newly-built concrete road in far greater degree than on other factors.

The formation of cracks in concrete road slabs can be ascribed to three causes:

A.—Dry heat or sunshine during the handling of the fresh concrete in the building of the road and during the setting period of the concrete, whereby a part of the water required for the setting and the hardening of the cement is evaporated and lost. This process can not be prevented through an increased addition of water in the preparation (mixing) of the concrete; on the contrary the danger of the formation of cracks is increased and a new danger, the segregation of the concrete, is created. The damage threatening in this case can be avoided through the employment of the generally-known protective measures, such as covering with wet sack cloths, straw packings, sand coverings, etc.

The use of pozzuolan cement likewise avoids or diminishes this danger in consequence of its content of colloids, which hinder the rapid evaporation of the water.

Another trass-cement highway in the upper Rhineland.

B.—Temperature effects (alternating great heat and cold) after the hardening of the cement. Hardened cement has, as is known, the property of reacting to heat and cold by expansion or diminution of its volume. If this alteration of volume exceeds the elastic capacity of the hardened cement, then breaks or cracks in the concrete slab occur. A cement with greater elasticity offers increased protection against such damages to the concrete road.

C.—Heavy traffic with its vibration and compression actions on the concrete slab can cause the formation of cracks in the concrete road slab. Strengthened construction, the incorporation of reinforcing steel web, and the utilization of a cement with high elasticity, for instance pozzuolan cement, help in preventing this evil.

The expansion joint seems, according to the widely-accepted conception of persons in the industry, to be a necessary evil. This conception is nowadays no longer correct, as experiences abroad prove. And anything which is possible abroad in construction engineering should not encounter any difficulties in the United States with its unlimited resources and its great corps of first-class engineers.

The illustrations show concrete roads without expansion joints and free from cracks after six years of use. A large number of such roads have been built in Germany, England, Holland,

Concrete road under construction at a grade separation in northern Germany.

Czechoslovakia and other European countries and have proved themselves well. Trass-Portland cement (pozzuolan-Portland cement) was used for the construction of these roads. It is not absolutely necessary to use a pozzuolan cement produced on the Portland-cement basis.

Fig. 7 shows a concrete road without expansion joints produced with trass-lime cement (pozzuolan-lime cement). This road was put into service for traffic in the year 1929 and was in December, 1936, as the writer of this article was able to verify personally, in the best of condition. In this connection it is to be considered that this road is situated in northern Germany and is exposed to severe frost periods.

Pozzuolan-lime cement can also be used advantageously in connection with asphalt and bitumen for road construction. Frost and thaw weathering damages to concrete roads, as well as to all other concrete-construction works, can be prevented if the concrete is absolutely watertight. Ice formation on the exterior of the concrete is not injurious; the well-known frost damages occur only when the water can work its way into the interior of the concrete and by the freezing action increase its volume by 10 per cent.

In using pozzuolan Portland cement or puzzuolan cement instead of normal Portland cement and in observing my general principles in the production of concrete works it is possible to build concrete roads which resist any frost danger.

Slipperiness of the concrete road, one of its greatest disadvantages, can be prevented by the rolling of coarse hard sand or fine crushed stone ⅛ to ⅜ in. in diameter into the still fresh upper layer of concrete. The good appearance of the concrete road surface does not suffer through the use of this process, nor is the friction resistance of the road to vehicle traffic increased; on the other hand, the danger of the slipping of the vehicle on wet roads is reduced. As standard Portland cement can not be rolled, pozzuolan cement, with or without combination with Portland cement, must also find application for this purpose.

Furthermore, the durability of the concrete road is considerably increased with the use of Portland-pozzuolan cement or pozzuolan-lime cement, which means a pleasant surprise for the taxpayer. But there is more at stake, the increasing of safety for life and limb in highway traffic.

Give the highway engineer the right materials, then he will eliminate the remaining disadvantages of the concrete road.

Washington

(from page 71)

Ben Cohen and Tom Corcoran, who drafted the President's wage-and-hour bill, have finished another proposed statute broadly setting up standards for fair trade practices, to complement the wage-and-hour bill. The document may be sent to the Congress in July. It provides that the Commerce Department create a Bureau of Industrial Economics to gather data, and to take over the system of voluntary trade-practice conferences and agreements originated by the Federal Trade Commission. While the Commerce Department would sponsor the expansion of the trade-practice conferences among all industries, the Federal Trade Commission would become the judicial body with authority to enforce all agreements.

Representative Cartwright in his amendment has provided that the $150,000,000 earmarked for roads in the relief bill would be allocated: $75,000,000 for Federal-aid roads; $50,000,000 for secondary feeder roads, such as rural free delivery mail roads, farm-to-market roads, and public school bus roads, and $25,000,000 to eliminate railroad grade crossings.

The Social Security Commission has filed with the House Ways and Means Committee 29 amendments to the Social Security Act which would increase the number now benefited by more than 5,000,000. This would bring the total to more than 35,000,000, and would include seaman and others working on ships flying the American flag, and employees of state and national banks; but does not include farm labor or domestic help. It deletes the 65-year old-age limit. The commission asserts the additional responsibilities will not increase operating costs.

Senator O'Mahoney's bill, S. 47 and S. 48, passed by the Senate, appropriated $800,000 to construct small dams and rehabilitate existing reclamation projects. Senator Walsh's bill, S. 2049, passed by the Senate, appropriated $13,500,000, with House concurrence, for the establishment of a naval air station on San Francisco Bay. S. 2086, Senators Hatch and Chavez, appropriates $6,000,000 for the Arch Hurley conservancy district in New Mexico. Senator Reynold's bill, S. J. 140, is designed to investigate the availability of metallic and non-metallic domestic minerals for national defense or industrial needs.

Representative Magnuson's bill, H. R. 6069, provides for the creation of a commission to negotiate within two years a highway to connect the United States, British Columbia, Yukon Territory, and Alaska. Representative Collins' bill, H. R. 6097, strives to secure $25,000,000 to build a highway between Nashville and New Orleans along the route of the old Jackson Military Road. Representative Johnson's bill, H. R. 6277, proposes the expenditure of $125,000,000 to eliminate railroad grade crossings throughout the United States. Representative Chandler's bill, H. R. 6439, provides for a complete revision of the Bankruptcy Act. Representative McClellan has offered a bill to provide for the expenditure of the remainder of the road and bridge flood relief appropriations for Arkansas in the Act of 1929 for the reconstruction of roads and bridges on the Federal-aid highway system destroyed by this year's floods. Representative Snyder's bill, H. R. 6665, appropriates $9,500,000 for the construction of four dams in the Younghiogheny watershed in Pennsylvania, as planned by the War Department.

The Wagner Housing bill, calling for a billion-dollar bond issue for loans to state and local authorities over a four-year period, is waiting for a vote in the Senate Labor Committee. It provides an appropriation of $50,000,000 to be used during the same period as subsidies to low-rent housing projects. The President wishes this bill to be made law.

The Senate and House committees which have been considering the President's Government Re-organization plan, split, utterly at variance over many phases of the project. It is considered that action on the plan at this session is extremely unlikely.

Brookings Institute Studies Recovery

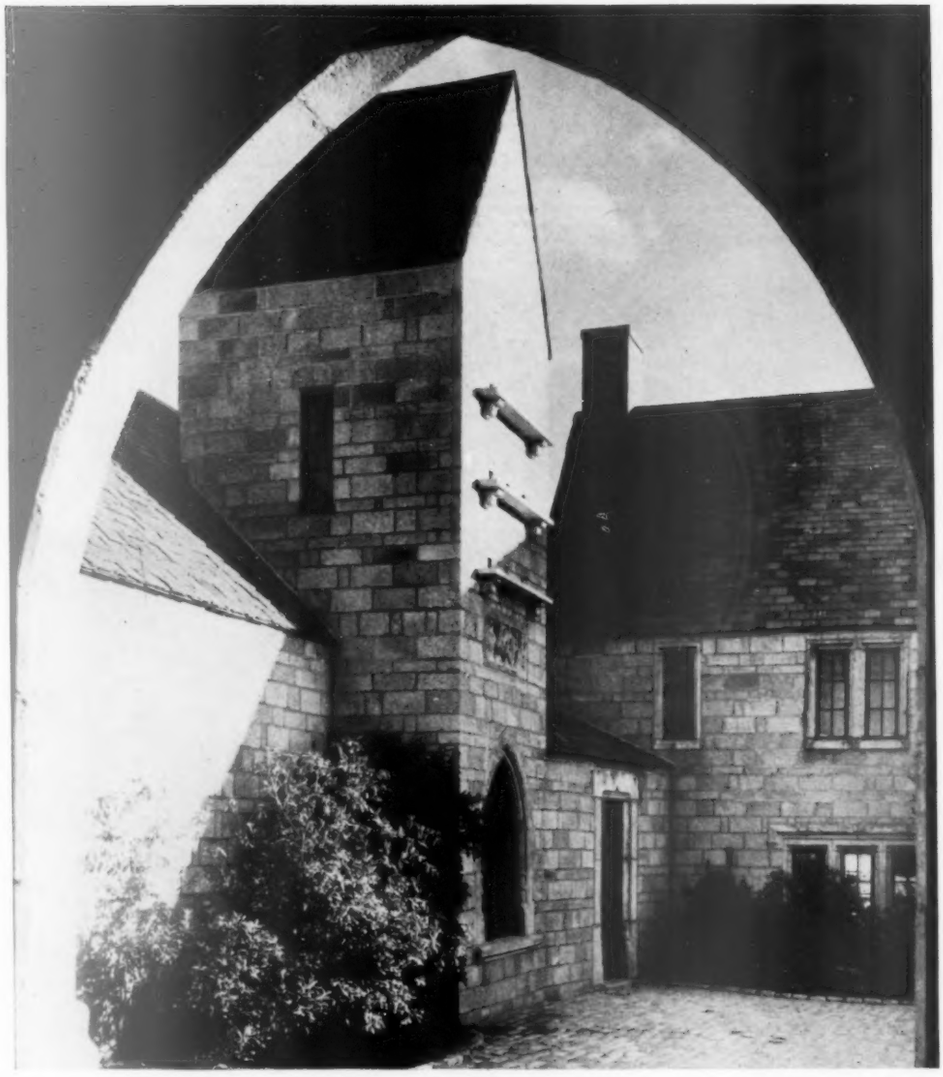
How long may the present recovery period be expected to last?

Is the present prosperity more stable than that of 1929?

What type of governmental policy is most likely to prove beneficial at this time?

Tentative answers may be found in a recent pamphlet, *Readjustments Required for Recovery,* published by the Public Affairs Committee of Washington, D. C. The pamphlet summarizes the findings of the Brookings Institute following an extensive study of the recovery problems facing the nation. Reasons were found for optimism regarding the future, but they were balanced by unfavorable factors which threaten to throw us back into the depression.

AND
PROFITABLE
New Products
SECTION



Connecticut farm group in which the irregular texture of the units was obtained by spraying as the blocks came from the machine.

By
D. R. (Spec) COLLINS
Asst. to Director of Promotion
Portland Cement Assn.

OPPORTUNITIES IN CONCRETE PRODUCTS

A SHORT time ago I had a letter from a friend of mine, Bob Damerel, who is in the sand-and-gravel business. He's had pretty tough sledding the past five or six years, but now his business is beginning to show a substantial pick-up. Much of this increase is due, he says, to housing and other small uses of concrete around the house. Now he wants to add another line to his business. His letter was asking advice as to whether or not he should go into the manufacture of concrete - masonry units.

Bob and I had gone to school together, so I started back in our school days with my reply. Here's what I wrote him:

"Bob, you probably remember the course in Journalism One, News Writing, that we took under Harry O'Brien. You'll recollect that one of the first things he taught us was that every news story, to be good, should have up in the lead paragraph six fundamental pieces of information — *Who, Why, What, When, Where* and *How*.

"Harry told us that if we had those essentials in the 'lead' we could make our stories as long or short as we wanted, but that they would always bear the earmarks of a good news story. In other words, we should have a survey of the entire situation condensed into a small space right at the start. Now wouldn't that be a logical manner of approach to your proposed venture into the concrete-products business? It's been eight years now since I've done any work in your market, but I believe the questions I'm about to ask you can apply to almost any market or almost any business. You can make up a chart of some sort and put down the answers. If the majority seem favorable, I'd certainly go ahead. There's money to be made in the products business if the market, the product and your sales methods are right.

"First let's take the *Who* angle. *Who* else is in the concrete products business in your community? Just what is the nature and strength of your competition? If there is a plant already established, is the owner making a good product and is he doing a good aggressive job of merchandising? Is he rendering a real service to his customers or is he merely letting them buy and then delivering what they

purchase? If you are going to have passive competition, you ought to be able to lick it with one hand tied behind you, with the aggressive sales methods used to build up your sand-and-gravel business.

"There are a lot of people in the concrete-products business to-day who are making money simply because they are making a good product and above all are using aggressive methods and merchandising. The fellow who is sitting back and waiting for people to batter down his door and buy his product is still at about the same level he was at in 1923 or 1924, merely making a living.

"Another *Who* that you are going to have to answer is *Who* is going to buy your product? Does your market justify your going after this type of business? You can check this up by going to the Building Department and looking up the number of permits for last year and some of the years preceding. You might even go back to the late 'twenties, when business was booming, and get an idea of the type of work for which you might sell your product. You should know *Who* is going to buy your material before you can intelligently make an investment in plant equipment.

"As far as the housing market is concerned, if you are going to sell just basements, you can figure about 1,000 blocks to a basement roughly, but if you are aggressive and push the sale above-grade, you can figure on selling three times that many for every job. And don't think there isn't a market for your product in stores, office buildings, theaters and schools. Get in touch with some of your present customers *who* might use your products. See how much they know about concrete masonry and whether or not they are obligated to buy from someone else or will buy from you.

"So, for your *Who*, determine these two things: (1) *Who* might buy your product and how much of it they might buy, and (2) *Who* are you going to have to compete with and what is the nature of this competition?

"Now the *Why* angle. *Why* are you justified in adding another line to your already successful business? Do you feel that your same salesman can sell both sand and gravel and concrete masonry? Will concrete masonry provide an outlet for your surplus material at a good profit? Is the market such that you can sell at a profit? Are your contractors favorable toward the material you propose to make? I'd say, off-hand, that a combination such as you propose is a logical one. I've always thought that your sales methods were above the average, and you certainly do know a lot more about making good concrete than most people. A number of sand-and-gravel producers have put this combination together with profitable results.

"As to *What*. *What* do you contemplate manufacturing, in addition to concrete masonry? Perhaps concrete joists, burial vaults or other miscellaneous products will help bolster up your line. *What* is the market for these other products? *What* investment will you need in the way of equipment? *What* sort of plant do you contemplate building and *What* will it cost to erect? *What* will proper equipment cost? *What* will be the return on your investment? *What* sales advantages will you have over others now in the business in your community? *What* service do you expect to render that the other fellow does not? *What* economies can the use of your product give the builder or contractor? *What* sort of selling effort will be necessary to build up your new business? *What* size units are used most in your market? There are a lot of *What's* connected with this business. The *What* answers will take more digging than some of the others. You'll have to know your market and its approximate consumption before you determine the size of plant or the sort of equipment you'll need. My advice is not to put in too much equipment at first. Get the most modern you can and lay out your plant so that you can add to it as business grows. Reputable manufacturers of concrete machinery will be glad to help you with this problem. And they'll continue to give you service. You'll find them generally a pretty straight-shooting lot not inclined to high pressure or overselling their customers. That's one thing I like about the fellows in the concrete-machinery business. They usually approach a sale just as though they were going into the business themselves and give it the same sort of thought and attention.

"Then *When*. *When* will you be able to put your new products on the

Exposed concrete units are attractive and in the modern mode when left exposed on interior walls.

Charm and permanance are combined in this residence, typical of many built with concrete masonry in Florida in recent years.

market? *When* are your markets best? At what season of the year? I ask this because often you can keep a good salesman at work on one selling job when others are rather slack. A *continuous* selling effort is essential and the addition of this new line may be just the thing. *When* your salesman gets an order for sand and gravel, is it possible for him to sell products as well? *When* you do will you have paved the way for it with aggressive advertising and selling effort? I add this last *When*, because I think it's essential that you do some advertising and selling before your plant gets into production. And I think it's essential that you keep up the advertising. You'll probably find direct mail most economical for a business like yours, though there are other effective means. If you have the opportunity to supply material for a demonstration house, I'd do it. Many products manufacturers have found this means of advertising one of their most profitable investments the past couple years, what with the housing market being what it is. Remember, too, such a house might provide an outlet for your sand and gravel in concrete floors, foundations, drives and other improvements. This advertising will have to be figured into the cost of your product, so don't forget it.

"*Where*—Naturally one of the first questions you should ask yourself is '*Where* are my markets?' That is, is there a sufficient market locally for a satisfactory volume or will you have to extend your selling efforts to near or distant communities? *Where* is the greatest building activity in relation to your plant? *Where* can you see a set-up similar to the one that you propose? *Where* are other sand-and-gravel producers conducting operations similar to the ones you propose? *Where* can you get experienced help to run your new plant? *Where* can you secure advice on merchandising and advertising your new products? I think it's essential that you visit a couple of plants similar to the one that you propose. You'll get ideas that you'll never get reading and you'll save yourself money by doing so. Such a trip may cost you a hundred or two hundred dollars, but it will be well worth it. Remember you're contemplating an investment of a good many times that.

An architectural effect obtained wholly by the use of concrete masonry.

Stucco applied direct on concrete-masonry walls as used on a creamery building in Houston, Tex.

"And finally, *How*. *How* are you going to develop this new business of yours? Are you going to rely on your present contractor customers or are you going to go after new ones aggressively? *How* are you going to provide for delivery of your product? Will you need new trucks or can you hire trucking done? *How* are you going to teach your salesmen the essential rudiments necessary to do a good selling job? *How* are you going to publicize and advertise your new products? *How* will you co-ordinate your new business with your old; in other words, *How* will you make each build up the other?

"Well, Bob, I've given you a lot of questions to ask yourself. But I'm of the opinion that this is the logical way to approach any new venture. Too many folks rush headlong into the concrete-products business without first making a thorough investigation of it. I know some of these questions overlap each other, but then that signifies their importance. Frankly, I think you have splendid possibilities. There has been a rather large mortality in the concrete-products business during the depression, but the folks that have come through are the real business men that are building a real industry.

"I'm inclosing several pictures with this letter. I'm doing so to give you an idea of just where you can sell your products to-day. You'll see that the business has come a long way from the old rock-faced block days, that concrete masonry is going into every sort of first-class jobs. And you'll see that with a little architectural imagination these are good-looking jobs, too.

"If there are questions you want to ask after you've answered all those that I've propounded, let me hear from you. And if you decide to go into the business I'll be glad to give you what help I can in getting the wheels turning and the tampers tamping."

1935 Sand and Gravel Census Figures Out

The U. S. Bureau of Census, reports that sand-and-gravel operations in the United States in 1935 employed 8,566 wage earners and paid wages totalling $8,340,408. The number of wage earners was obtained by averaging the total reported on pay rolls on the 15th of each month. This procedure gives a somewhat lower figure than the total number actually engaged in the production of sand and gravel during the year for more than 10,000 were employed in the peak months. Salaried officers, technical and supervisory employees, and others working on a salary basis in sand and gravel production in 1935 totalled 2,086 with salaries amounting to $3,820,735. Expenditures for supplies and materials, fuel, and purchased electric current amounted to $11,948,889. Supplies and materials comprised 69 per cent. of the total; fuel, 15 per cent.; and purchased electric current, 16 per cent. The total value of products of the sand and gravel industry in 1935 was $53,700,627, which includes $459,675 for work or services.

Railroad cars being moved with a Caterpillar 30 tractor at the Brand & Deal sand-and-gravel plant, Elkhart, Ind.

CONCRETE MASONRY IN THE MODERN MANNER

Patterned after the exhibit building erected for the Century of Progress Exposition at Chicago in 1933 and 1934, but built for permanence with concrete masonry, the Ford Motor Co. has erected the Courtesy Building shown above at Dearborn, Mich.

RIGHT—An interior view of the rotunda of the Ford Courtesy Building as construction was nearly complete showing the concrete-masonry back-up. More than 150,000 units—90,000 gravel and 60,000 cinder block—were used on this job.

By J. MORLEY ZANDER,
Saginaw Brick Co., Saginaw, Mich.

THE USE OF LIME FOR BRICKS AND BLOCKS*

THE manufacture of sand-lime brick is a chemical as well as a mechanical industry. The component parts of the formula are lime, water, silica and the resultant calcium hydro-silicate is a cementing bond of great strength. Considerable able research work has been done by the United States Bureau of Standards and other agencies, both in the United States and other countries to determine this bond and its characteristics under different conditions.

It appears that the bond derives its strength from the action of lime and water and heat on the silica in the sand. To secure this reaction it is necessary that all the ingredients be carefully and thoroughly brought together, mixed, pressed and steam-treated. Some makers of sand-lime products feel that a better control over the proportions and mixing of materials is regularly obtained if the lime is hydrated before mixing with the sand. Other manufacturers believe that a better brick results from hydrating the lime in the sand. In this paper no discussion will be made on the relative merits of the two systems. Rightly used, they both produce very fine brick.

The one fact that is common to both systems is the absolute necessity of accurate measuring and thorough mixing. In the modern brick factories the measuring is done by machines under visual supervision and the mixing is both a stirring and kneading or grinding process. The tendency for years has been for brick plants to invest more money in better methods of mixing and this improvement still continues. No commercial plant has ever mixed its materials for brick too much, so it is probable that the search for better mixing will be continued for some time to come.

The next step in making sand-lime products is the molding and compressing of the bricks or other units. Like the mixing, the necessity for a close contact of the silica and lime is so great that pressing or compacting must be hard and complete. In making bricks the compacting is nearly always done by pressing; in making blocks and tile it is nearly always done by tamping. In both instances the machines must have rugged power, accuracy, and speed to do the work.

The third step in completing the lime-silica compound and finishing the commercial product is to subject it to a steam pressure of 100 lb. or more per sq. in. This is done in all plants in the same way. The bricks or other units are loaded from the press on steel cars and run into horizontal cylindrical retorts. These retorts are generally 6 or 6½ ft. in diameter and up to 100 ft. in length. After the retort is filled with bricks a head is swung into place over the open end and bolted or otherwise secured steam-tight. These retorts are then filled with live steam to a pressure of 100 lb. or more per sq. in. After curing in this steam for from 6 to 12 hr. the bricks are ready for the market.

The finished bricks are of light color, white or light gray, or if the sand has other colors, they will be tinted accordingly. Sand-lime bricks should not be confused with lime-mortar bricks. Lime-mortar bricks appear to have been used from time immemorial, but it was not until 1880 that the process of high-pressure steaming was patented by Dr. Michaelis. This steaming is an essential step in obtaining calcium silicate from sand and lime.

So far as I have been able to learn, there is no evidence to show that lime and sand will act together at ordinary temperatures to form calcium silicate even in centuries of time. The making and using of lime-mortar bricks in the United States goes back to 1838. These lime-mortar bricks, while quite satisfactory, and still in walls, are not the same as present-day sand-lime bricks because calcium carbonate is the binding agent.

With Dr. Michaelis's discovery of high-pressure steaming, which produced calcium hydro-silicate as a bond, the present sand-lime-brick business was started. Since that time lime hydro-silicate bricks and other masonry units have been produced and used in all parts of the world. The first successful plants to produce the present sand-lime bricks, or calcium hydro-silicate bricks, in this country were erected in 1900 and the industry has progressed steadily since that time.

About 350 lb. of hydrated lime is needed to make 1,000 standard-size bricks, or 100 blocks. On this basis a sand-lime-brick factory producing 30,000 bricks per day will use about 5 tons of lime per day, or from 1,000 to 1,200 tons per year. This same factory will require in addition to the lime used, about 50 cu. yd. of sand, 3 tons of coal, and 100 electrical hp., per day. It can be successfully and satisfactorily operated the year around. The bricks are ready for market or use the next day after making, and arrive dry and clean on the job. Commercially sand-lime bricks have won recognition by their merit, which is considerable. To meet with engineer's approval these bricks must comply with Federal Specifications for Bricks —Sand Lime, under SS-B-681, or A. S. T. M. Designation C 73-30. Both these specifications set up definite standards of quality. Through the years sand-lime bricks have been able to meet rigid specifications and have steadily improved in quality and in the respect of the building trade. It is good that this constant improvement is going on, because competition is very keen. The manufacturer who produces the bricks finest in appearance and highest in enduring strength is the one who can get the business. So carefully do the successful sand-lime-brick makers constantly check the quality of their product, that the one most potent argument they have and use is this: put our bricks and the competitive bricks through the regulation tests. This competitive test has sold many millions of sand-lime bricks and still is selling them.

In recent years much masonry work has been done with units larger than bricks. A number of sand-lime-brick makers have met this trend by making and marketing sand-lime blocks, similar in size and shape to cement blocks, tiles, and slabs. With these units a very beautiful wall is built. These walls are smooth and clean in appearance and in many instances no other finish is used on the interior of the building. The popularity and, likewise, the production of these units is increasing rapidly.

* Presented at 1937 convention, National Lime Assn.

The pipe machine with turntable and molds in center and mixer at left.

Concrete Pipe Plant Has Large Capacity With One Machine

THE Arlington Concrete Pipe Corp. at Arlington, Va. operates a modern concrete-pipe plant in which one machine makes more pipe in a day than many men were formerly able to make by hand. This company was formed in July, 1934 and late in that year built this plant to fill a contract in Arlington County for 104 mi. of sewer pipe ranging from 8 in. to 42 in. in size. After this contract was completed other work in sight resulted in the decision to operate this plant permanently. Since then this plant has filled a number of other large contracts in this area and large quantities of pipe have been supplied to Alexandria, Washington and Bolling Field. Most of the pipe produced is used for sanitary and storm sewers, highway and railroad culverts, and for drainage and irrigation systems. In 1936 a total of over 300,000 ft. of pipe was produced and sold.

The sand and gravel are loaded by hand shovels into wheelbarrows, which are gaged for volume, and dumped into a skip. The cement is added from sacks. The skip discharges the batch into a Besser 25-cu. ft. horizontal blade-type mixer in which water is added. A 15-hp. electric motor drives a shaft from which both the mixer and the skip are operated.

The concrete is discharged from the mixer on an inclined-slat conveyor from which it is discharged into the feed hopper of the pipe machine.

The McCracken Pipe Machine Co. Packer-Head pipe machine is the Model "E" series, the latest improved type of machine made by this company. It can make any size of pipe from 4 in. to 30 in. but 24-in. pipe is the largest being made by the machine in this plant. Both plain and reinforced corrugated pipe are made. This machine has a dual packer head with a separate head packing the bell and troweling it on the inside. The mix used varies with the specifications, the cement content varying from 4.9 to 5.5 bags per ton.

The output of this machine also varies with the size and type of pipe

(Continued on page 83)

Cart which hauls molds from machine to pipe curing room.

The plant of the Arlington Concrete Pipe Corp. with some of the stock of pipe carried to meet large orders.

The 25-cu. ft. horizontal blade mixer with loading skip at left.

The six mixer trucks of the I. E. Schilling Co. lined up on Biscayne Boulevard in Miami, Fla. in front of the Ford Motor Co. exhibit buliding for which this company supplied all the concrete.

Miami Concrete Producer Steadily Enlarges Delivery Truck Fleet

By W. E. TRAUFFER

THE building "boom" in and around Miami and Miami Beach, Fla., which has been gaining in momentum for the past several years, has resulted in a steadily growing demand for all kinds of building materials. The advantages of purchasing ready-mixed concrete over mixing it on the job are realized by most of the contractors in this area and most of the concrete used is now being supplied from central-mixing or batching plants.

Concrete being discharged from truck for small home foundation.

The first producer of pre-mixed concrete in this area was the I. E. Schilling Co., which is now in its 25th year. This company handles a complete line of building supplies including sand, rock, structural steel, tile, brick, cement, lime, gypsum, gypsum products, reinforcing steel, concrete and clay pipe, etc. In 1938 this company erected its present central-mixing plant and began delivering concrete in dump trucks. In April, 1936 a Concrete Transport Mixer Co. truck-mixer was purchased and since that time five more machines of that kind have been added. One has a 1½-cu. yd. body and the others are 2-cu. yd. units. All are mounted on Ford chassis.

The company's main yard and concrete plant are located on the bank of the Miami River on the edge of downtown Miami. Sand and native fresh-water coral rock are delivered in barges and are unloaded by crawler cranes to stock-piles or into the mixing plant bin. The Butler 2-compartment steel bin has a capacity of 75-cu. yd. Stone and sand are discharged from this bin into a 1-com-

One of the trucks being loaded at the mixing plant.

partment Butler 1-cu. yd. weighing batcher with a 2-beam scale. Cement is added from bags. The batched aggregates and cement are discharged into a 1-cu. yd. T. L. Smith mixer, where water is added from a tank with an automatic valve. Most of the concrete produced is sold for general building work in Miami and Coral Gables within a 10-mi. radius. With these six trucks from 150- to 175-cu. yd. of concrete can be mixed and delivered in an 8-hr. day.

According to W. G. Coffeen, president of the I. D. Schilling Co., the local aggregates are much softer and more absorbent than those ordinarily found elsewhere and are much more difficult to mix thoroughly. The company tries to keep the concrete slump between the limits of 4- and 6-in. At the lower slump the concrete mixture is very sticky until thoroughly mixed. Mr. Coffeen believes that these characteristics of local aggregates make it necessary to pre-mix the concrete at the plant in order to insure thorough mixing even on a short haul. Concrete produced at this plant is left in the mixer for at least 1½ min. before it is loaded into the trucks. Most of this concrete is designed for 2,500-lb. strength and a true mix of 1:4.62 or a nominal mix of about 1:2½:3½ is used.

This central-mixing plant is so arranged that, in case of a power failure, the batched ingredients can be loaded direct into the trucks and mixed on the way to the job. According to Mr. Coffeen, these Concrete Transport Mixer Co. bodies work equally well as mixers or agitators.

The company also has a yard on the water front at Miami Beach where a complete line of building materials is carried. A total of five crawler cranes, four Ford dump trucks, and four Ford flat-bodied trucks are used at both yards, and additional trucks are hired when needed.

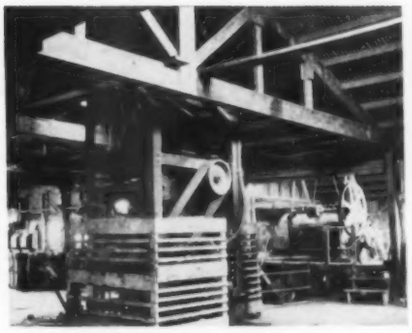
Arlington

(from page 81

made and the number of men serving it. Producing 6-in. to 12-in. pipe with a crew of 5 men, 1,500 ft. of pipe can be turned out in an 8-hr. day. With a full crew of 10 men 2,500 ft. of the same size of pipe can be produced in the same period. On sizes from 15 to 24 in. in diameter a crew of 9 men can produce 1,200 ft. of pipe daily.

The molds rest on a 4-hole turntable so that empty molds are constantly available without delaying the operation of the machine. The packed molds are transferred from this table by special 2-wheel handling carts to the curing rooms, where they are immediately stripped. No supporting pipes in the pallets are necessary. These curing rooms have overhead spray systems under which the pipe is kept for 7 days. It is then transferred to the outdoor storage yard, where it is allowed to cool further for 14 to 28 days before it is shipped. The company has a Ford truck with a 12-ton flat-bed trailer which is used to handle pipe on the yard and for some deliveries. On large jobs the contractors haul their own pipe and for others most of the deliveries are made in hired trucks.

This pipe machine can make pipe in either 3-ft. or 4-ft. lengths and in any of the three following types: bell-and-spigot, tongue-and-groove, or butt-end. For reinforced pipe a one-piece wire cage is used. Wye and Tee specials are made by inserting stubs in holes cut in the pipe after both have been partially cured. These stubs are made in special short molds and have an extra thick bell. When cementing this stub in the hole a thin piece of sheet iron is braced across the opening on the inside of the main branch to prevent the cement grout from entering it.



Another view of the pipe machine with mixer and skip at right.

Pipe from 24-in. to 42-in. diameters inclusive is made by hand with Quinn hand-cast molds and tamping machines.

The McCracken pipe machine has a variable-speed transmission on the packer-head elevator which can be adjusted for the size of pipe being made. The machine is driven by a 50-hp. electric motor through a V-belt and inclosed worm-gear drive. All the gear casings are dust- and oil-tight and all the moving parts of the machine have safety housings.

Another view of the I. E. Schilling Co. yard showing how aggregates are unloaded from barges to stockpiles. Mixing plant is in center.

DON'T BUY PIPE EQUIPMENT *until you do* THIS

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Soil scientists have adapted, and highway engineers have applied to road building, the properties of cohesion and friction to produce endurance, and firmness. Certain soils develop and retain their desirable properties when mixed with moisture-regulating Calcium Chloride and provide a stabilized road at very low cost.

Fortunately, most of the needed soils are available in or near regular pits and quarries. Much of the bulk consists of overburden soils and finer aggregates, often unsalable in commercial work except as "fill" dirt. Much of the equipment necessary for testing, grading, proportioning and mixing is already in the pits and quarries.

So it costs aggregate producers very little to get into this profitable business of supplying "stabilized soil mix." Bulletin number 34 tells how. Write for it today.

Above—A typical Michigan stabilized road.

Left—Pit operations using clay overburden, at New Hudson, Michigan.

Below—Sandwich Fairgrounds stabilized road, De Kalb County, Ill.

Calcium Chloride Association

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The Columbia Alkali Corporation · Barberton, Ohio
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Users will also tell you that Jaeger's light weight and long life, because of highly developed design and the use of Man-Ten Alloy Steel, cut repair bills on mixers and trucks—save on tires—save on gas—help bring operators the maximum profit that comes from low cost operation.

Because these features assure dependable, economical delivery of the finest concrete, more ready-mixed concrete is being delivered with Jaeger Truck Mixers than by any other method. In towns under 10,000 up to largest cities, Jaeger equipped plants are building bigger business and earning prosperity incomes for their owners. Write for catalog and information that will help you plan for a bigger share of this fast-growing market.

Pioneer Truck-Mixer User Tells of JAEGER Experience . . .

"Writer was original transit mix operator in Cincinnati metropolitan area. Since 1929 have bought 30 Jaeger mixers. Original 15 units, bought in 1929-30, poured over 300,000 cu. yds. of concrete in 3½ year period and are still in first class condition, good for indefinite service. To take care of peak pours have rented other makes of transit mixers. Several times engineers in charge asked us to put the rented equipment on other work as they preferred concrete produced by our Jaegers. Jaeger service on repair parts necessary on any mechanically operated unit is prompt. Very pleased to have you use my name as a satisfied user." The Howard Concrete Producing Company, Cincinnati, O.

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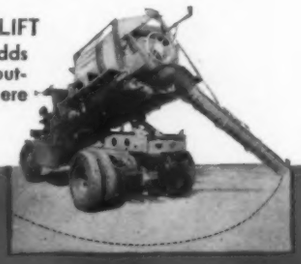

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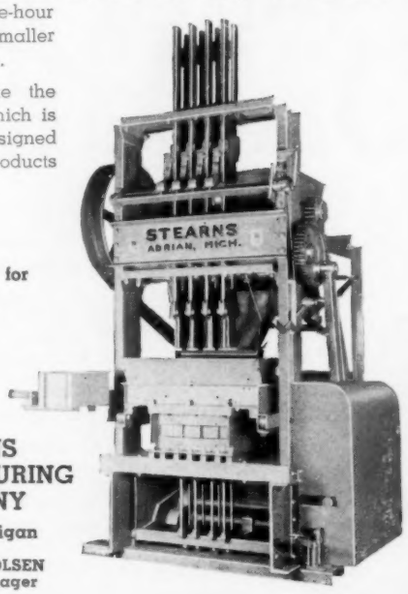
We also make the Stearns Mixer which is particularly designed for concrete products plants.



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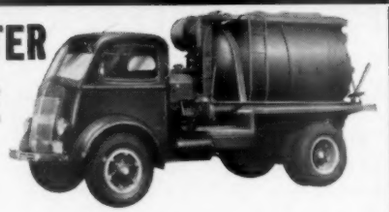

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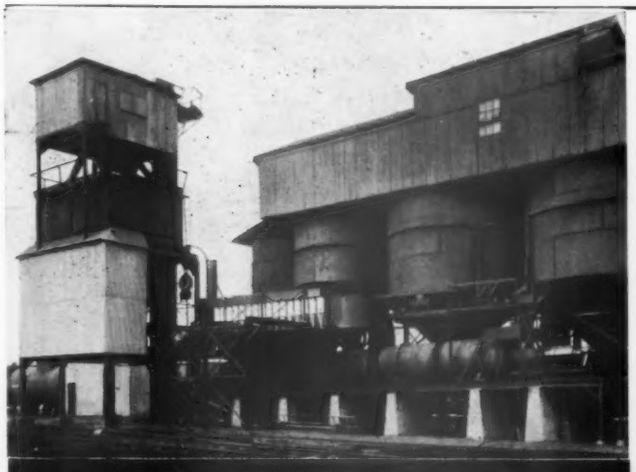

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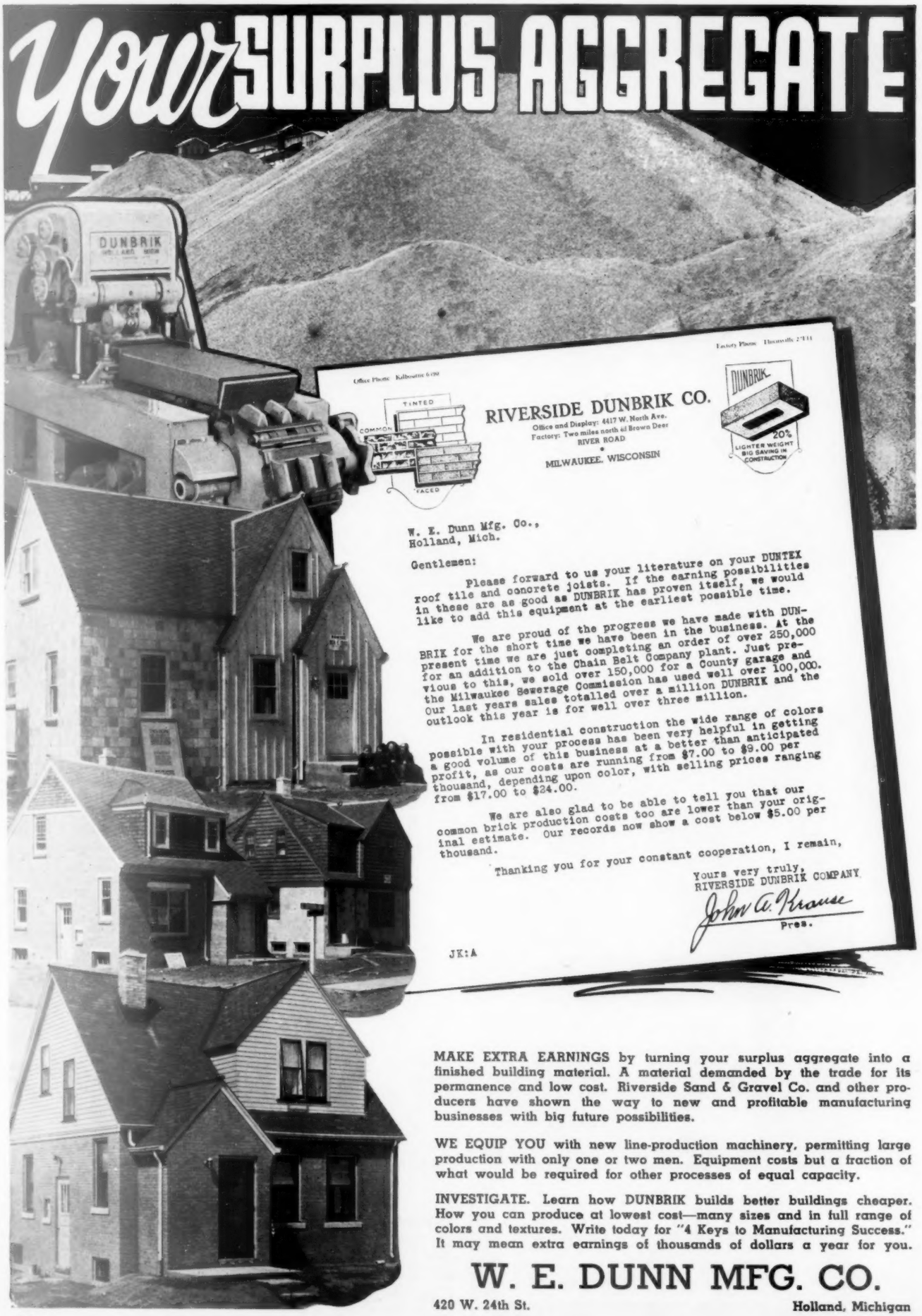
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Gentlemen:
Please forward to us your literature on your DUNTEX roof tile and concrete joists. If the earning possibilities in these are as good as DUNBRIK has proven itself, we would like to add this equipment at the earliest possible time.
We are proud of the progress we have made with DUNBRIK for the short time we have been in the business. At the present time we are just completing an order of over 250,000 for an addition to the Chain Belt Company plant. Just previous to this, we sold over 150,000 for a County garage and the Milwaukee Sewerage Commission has used well over 100,000. Our last years sales totalled over a million DUNBRIK and the outlook this year is for well over three million.
In residential construction the wide range of colors possible with your process has been very helpful in getting a good volume of this business at a better than anticipated profit, as our costs are running from $7.00 to $9.00 per thousand, depending upon color, with selling prices ranging from $17.00 to $24.00.
We are also glad to be able to tell you that our common brick production costs too are lower than your original estimate. Our records now show a cost below $5.00 per thousand.
Thanking you for your constant cooperation, I remain,
Yours very truly,
RIVERSIDE DUNBRIK COMPANY
John A. Krause
Pres.
JK:A

MAKE EXTRA EARNINGS by turning your surplus aggregate into a finished building material. A material demanded by the trade for its permanence and low cost. Riverside Sand & Gravel Co. and other producers have shown the way to new and profitable manufacturing businesses with big future possibilities.

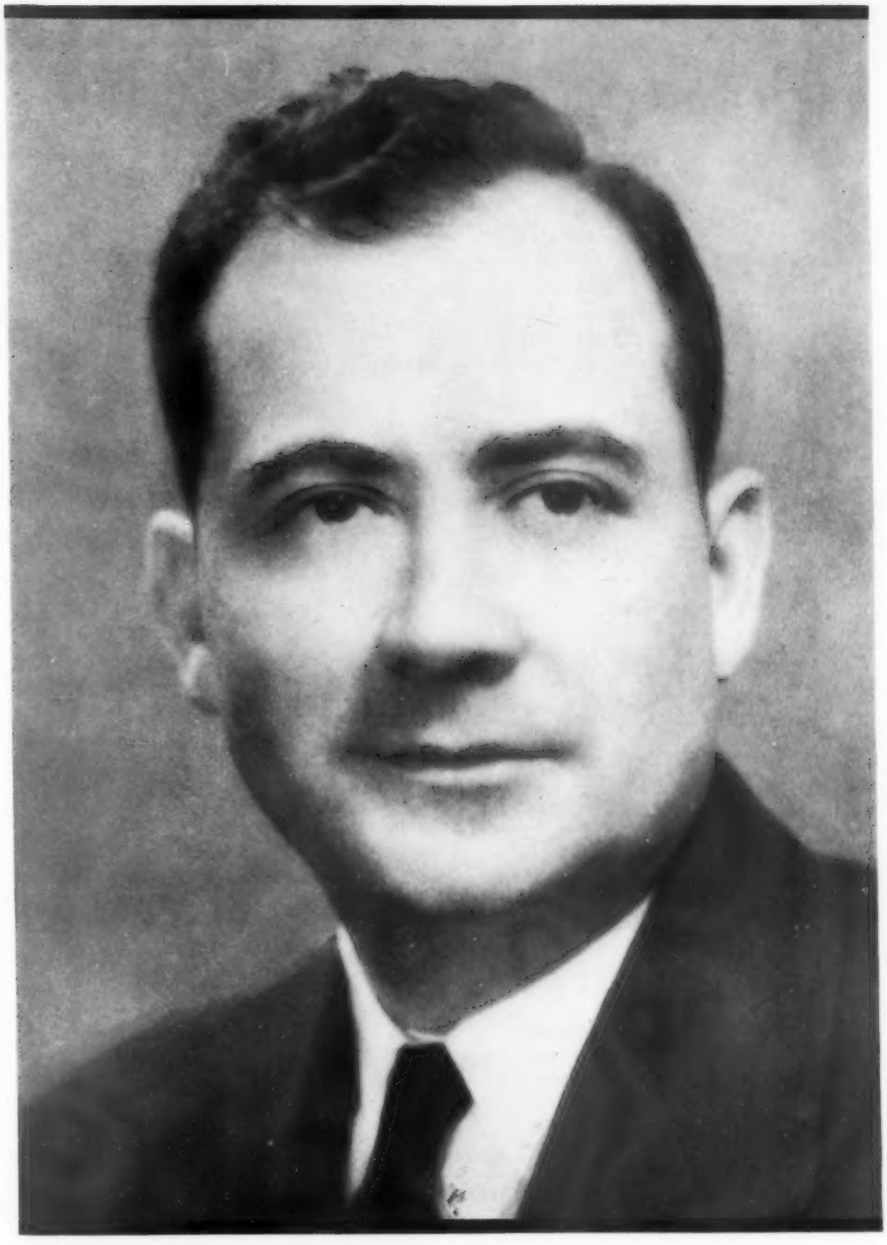
WE EQUIP YOU with new line-production machinery, permitting large production with only one or two men. Equipment costs but a fraction of what would be required for other processes of equal capacity.

INVESTIGATE. Learn how DUNBRIK builds better buildings cheaper. How you can produce at lowest cost—many sizes and in full range of colors and textures. Write today for "4 Keys to Manufacturing Success." It may mean extra earnings of thousands of dollars a year for you.

W. E. DUNN MFG. CO.

420 W. 24th St. Holland, Michigan

WM. J. REARDON
President
Reardon Cement Co.



MEN · OF · THE · INDUSTRY

After being mustered out of army service in 1918, Mr. Reardon joined the Carney Cement Co. traveling over most of the country for the firm. In 1928 he assumed charge of the Carney Distributing Co., leaving two years later to organize the Reardon Cement Co. Headquarters are maintained at Cincinnati and the company's product, stainless cement, is produced at the Marblehead Lime Co. plant in Chicago. He has long been active in public service, flood-control work and civic affairs, being at present an active member of the stream-pollution committee of the Cincinnati Chamber of Commerce which drew up the Barkley-Vinson stream-purification bill now pending in Congress. He is 37 years old, a native Cincinnatian, and was admitted to the bar in Ohio in 1928.

Personal Mention

C. L. WATERBURY, connected with the Highways and Municipal Bureau of the Portland Cement Assn., Chicago, for the last five years has resigned to joint the civil-engineering department of the Chicago, Milwaukee & St. Paul R. R.

L. T. MCGUIRE, for 18 years with the Byers Machinery Co., as assistant sales manager, has recently entered the employ of the Harnischfeger Corp. of Milwaukee as divisional manager of the large excavator division.

WILLIAM QUINN and C. N. ATKINSON are opening up a silica-sand deposit near Big Bend, S. D.

JOHN C. CURTIS, formerly chief engineer of the Cleveland Rock Drill Co. has joined the engineering staff of the rock-drill division of the Sullivan Machinery Co., succeeding ARTHUR R. HOSKING who has been promoted to assistant manager of the division.

J. B. LAWRENCE of Sarasota, Fla., recently acquired more than 60 acres of travertine deposits in Manatee County, Florida.

JOHN H. WAGNER, formerly with the Harnischfeger Corp., has become identified with the Tractor & Equipment Co., of Chicago and Springfield. Mr. Wagner is covering the territory south of Chicago, making his headquarters at Kankakee, Ill.

W. R. BOYER of Milford, Del., has purchased the concrete products plant formerly owned by J. H. Dolphin. He plans installing considerable new equipment.

C. H. CHAPLIN, who has been serving as assistant to manager, marketing division, and H. C. MOORE, formerly special representative, are now members of the marketing division staff, Appalachian Coals, Inc., Cincinnati, O.

D. D. WILLIAMSON, formerly head of the Texas State Highway Dept. laboratories, is in charge of the new Dallas office of The Asphalt Institute.

VICTOR G. FOSHINBAUR of the cement-products bureau, Portland Cement Assn., Chicago, is making a tour of the New England states promoting concrete-house construction.

ARTHUR BROCK, formerly with the Aerocrete Western Corp., Chicago, Ill., has joined the research-laboratory staff of the Portland Cement Assn. at Chicago. Mr. Brock is a well-known structural engineer and was a member of the association staff many years ago.

R. D. HESS has been made superintendent of the Ft. Dodge, Ia., plant of the United States Gypsum Co., succeeding P. W. SINWELL who has gone to manage the company's operations at Oakfield, N. Y.

OLIVER P. HARRIS, formerly sales manager of the Permutit Co., New York, N. Y., has been placed in charge of sales by the Standard Lime & Stone Co., Baltimore, Md.

L. L. ALLER of LaRue, O., was reelected president of the Ohio Sand & Gravel Co. of Columbus, O., at a recent meeting of the board of directors.

S. D. MAHAN has been appointed general advertising manager of the Westinghouse Electric & Mfg. Co. He was formerly manager of merchandising advertising.

WM. G. HULBERT, formerly superintendent of the Easton plant of Taylor-Wharton Iron & Steel Co., has been appointed General Works Manager in charge of manufacturing at both the Easton, Pa., and High Bridge, N. J. plants.

GEORGE A. NICHOLSON, son of the late George E. Nicholson, has been elevated to the presidency of the National Cement Co., Birmingham, Ala. He was formerly vice-president. LEONARD BAYER, formerly assistant to the president has been made executive vice-president.

CHARLES WARNER, JR. was elected a director of the Warner Co., Philadelphia, Pa., at the annual meeting of the company held at Wilmington, Del. Other directors were re-elected.

J. J. BASSETT has been made superintendent of the Oglesby, Ill., plant of the Lehigh Portland Cement Co. to succeed JOHN YOUNG who has become director of industrial relations. Mr. Bassett was formerly assistant superintendent.

LELAND HUTH, who has been bookkeeper in the office of the Massillon Washed Gravel Co., Navarre, O., for several years has been promoted to office manager.

FRANK R. BABCOCK has resigned as advertising manager of the Nash Motors Co., effective June 1, to become advertising manager of the United States Gypsum Co., Chicago.

ALVA HANCOCK of Brownstown, Ind., plans to manufacture mineral wool at a plant to be erected at North Vernon, Ind.

EARL PLAYFORD, an employee of the Independence, Kan., plant of the Universal Atlas Cement Co. was painfully burned a short time ago when he came in contact with an electric power line at the plant.

JACK O. BORN has been made superintendent of the Convoy, O., plant of the France Stone Co. He was connected with the company some years ago but had been engaged recently as a WPA supervisor at Kenton, O.

PHILLIP G. ROBIN has been appointed eastern district manager in charge of the New York office and warehouse of the Owen Bucket Co. of Cleveland, Ohio.

R. W. Ross of Wabash, Ind., is erecting a mineral-wool plant at Lagro, Ind., at a reported cost of $35,000. Operations are scheduled to start late in June.

WILLIAM J. LAWRENCE, a director and vice-president of Hercules Powder Co., has resigned, effective May 5, to devote his entire time to the many businesses in which he is interested in the Middle West and the South.

GEORGE H. MASSEY has been appointed to represent the Kentucky Rock Asphalt Institute in Maryland and the District of Columbia. Mr. Massey has been engaged in P.W.A. work for the last three years. Prior to that he had been consultant on various engineering projects, with headquarters at Norfolk, Va.

C. H. KINNEY has been named sales manager of the Trailer Co. of America, Cincinnati, O., succeeding A. J. WOLTERING who has been advanced to executive vice-president.

L. W. KNAPP has been appointed to the sales engineering staff at New York by Oliver United Filters Inc. He was formerly with the Oliver Continuous Filter Co. and more recently with the Taintor Co.

W. W. MEIN, president of Calaveras Cement Co., has sailed for England to make a three-months' study of current practices and developments in the European cement industry. He is taking an automobile along and will drive through England, Germany, Italy and France, visiting all principal cement plants.

JOHN W. WHITE has been elected vice-president and general manager of the Westinghouse Electric International Co. He will make his headquarters in New York.

W. C. JOHNSON has been placed in charge of a newly-opened office of the Allis-Chalmers Mfg. Co. in the National Bank Bldg., Knoxville, Tenn.

Coming Events

June 17, 1937 White Sulphur Springs, W. Va. — Mid-year meeting, board of directors, National Crushed Stone Assn., Greenbrier Hotel.

June 24-25, 1937, Buffalo, N. Y.—Meeting, board of directors, National Sand & Gravel Assn., Hotel Statler.

June 28-July 2, 1937, New York, N. Y.—Fortieth annual meeting and exhibit, American Society for Testing Materials. Waldorf-Astoria Hotel.

CHARLES E. HEATH, vice-president and general manager of the Fate-Root-Heath Co., Plymouth, O., builder of Plymouth locomotives, died May 19.

J. H. MORROW, 66, vice-president and treasurer of the Morrow Manufacturing Co., Wellston, O., died recently of a heart ailment. He had been identified with the firm since 1920.

ROBERT MOLLETT, postmaster at Lewisburg, O., and a former plant superintendent for the National Lime & Stone Co., passed away a few weeks ago.

FORREST WARD, 65, quarry operator and highway builder of Lebanon, Ky., died suddenly of a heart attack on June 3 while enroute from his home to his office.

JOHN S. LUTES, 65, president of the Eaton Canyon Rock & Sand Co., Pasadena, Cal., and former city director of Pasadena, died suddenly of a heart attack on May 5.

JAMES MOORE, JR., 37, assistant superintendent of the Standard Slag Co. plant at Ironton, O., for the last ten years died after a brief illness on May 23 at an Ironton hospital.

FRANKLIN A. GIBSON, office manager of the Waterford Sand & Gravel Co., Waterford, Ont., passed away recently while on a visit to South Carolina. He was born in England, 56 years ago.

RICHARD I. STEARNS, 90, retired president of the Stearns Lime & Stone Co., Chicago, died May 3 at his home in Chicago. He was a native of that city, having been born in a house at the corner of Dearborn and Adams Sts., now in the heart of the "loop" skyscraper district.

W. H. GILTNER, 66, a director and one of the founders of the Ohio Valley Rock Asphalt Co., died of a heart attack at his home in Louisville, Ky., recently.

SHIPPENSBURG, PA.—Walker Bros. gravel plant makes *cheap* power for crusher and screening equipment, including compressor and generator! This pair of Type G-AW Diesels is rated (each) 110 H. P. at 327 r.p.m. Let us help YOU slash YOUR power costs!

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Mt. Vernon, Ohio — PLANTS — Grove City, Pennsylvania
25 West 43rd Street, New York City · Mills Building, Washington, D. C. · 201 East 1st Street, Tulsa, Oklahoma · 53 Duncan St., Gloucester, Mass. · Esperson Building, Houston, Texas · 631 Spring Street, Shreveport, La. · 640 E. 61st St., Los Angeles, Calif.
Magnolia Building, Dallas, Texas · Gas and Power Equipment Company, Birmingham, Alabama

Foreign Developments

Study Heating of Cement During Set

The proposal to observe the heating of cement during set as a possible substitute for the unreliable standard setting-time test is not new, although increased attention has been paid to the whole subject recently on account of the recent studies on the heating of cement in large concrete masses. The present study is based on the record of numerous tests and observations made at the German Materials Testing Society in Czechoslovakia, and shows that the difference in the "rate of set" and the varying effect thereon by different working temperatures, for the measurement of which temperature curves are a simple method, indicate the range of use for which the different sorts of cement are adapted. The smaller the heat losses are, the greater is the suitability of the cements with slower heat development. The lower the surrounding temperature is, the greater is the advantage of employing cements with a faster rate of heat development, that is, of high-test (special) Portland cements, and especially of alumina cements. It is known that below 0 deg. C. the latter can be regarded as the only fully reliable cements.

The observation of setting time, as it is conducted according to the standard testing method, can not alone indicate the suitability of the different sorts or brands of cement. Especially at lower temperatures a faster rate of heat development can favorably affect the quality of the mortar and concrete, and it would be a forward step for the industry if the special properties in this respect were better known.—A. Bereczky and A. Koch in *Zement* 26:87-90, Feb. 11, 1937.

Action of Alkali Chlorides in Cement

The investigations reported in this article were undertaken with the aim of clarifying the chemical and physical action of the alkali chlorides (those of practical importance being the chlorides of sodium and potassium) on cement and concrete. The main experiments were with the cement substance; secondary experiments were made with concrete, both fresh and aged. Eight different cements were used, and NaCl and KCl in both twice-normal and saturated aqueous solutions. Parallel tests were conducted with the same solutions and like, and hydrated alumina.

The experimental results show, in addition to the simple physical process of leaching, a significant chemical reaction: the partial conversion of the calcium oxide hydrate with the alkali chloride, forming calcium chloride and alkali oxide hydrate. The behavior of the different cements is strikingly individual. In certain cases it was possible to show with high probability that of the calcium chloride which forms a part is combined in the basic mass, as oxychloride and as calcium chloroaluminate, but that alkali can also go into an insoluble form, probably as a zeolitic compound. In the case of alumina cements the extraction of considerable quantities of alumina by the caustic alkali which forms is the principal destructive force, while in their case the loss of lime plays only a secondary part, probably because of the combining of this oxide into very stable aluminates and silocoaduminates. The silica of cement in general scarcely inters into any noticeable reaction with the alkalies.

The cements prepared with sand into concrete-like masses varied considerably in contact with the aggressive solutions, according as the specimen was exposed comparatively fresh or after the development of carbonate surfaces. The experiments verified the practical experience that the surface layer of carbonate which develops forms an excellent natural protective material against the attack of water and salt solutions, to which it is impossible to pay too much attention in the production of concrete for sea water construction, salt silos and containers.

The high sensitiveness, of alumina cements especially, to sea water is adequately explained from the chemical and physical facts described.—Dr. F. Hundeshagen in *Zement* 26:103-106, 117-120, Feb. 18 and 25, 1937.

Determination of Free Lime in Cement

In the investigations reported in this paper (a portion of a longer study on the magnesia in Portland cement), various raw mixtures of calcium carbonate, ferric oxide and magnesia were heated at varying temperatures in an electric resistance furnace, and the free lime determined. In a mixture containing 28.7 per cent. CaO, 56.9 per cent. Fe_2O_3 and 14.4 per cent. MgO, calcium ferrite and magnesium ferrite were formed at 800° C. and increased as the temperature rose. $2CaO.Fe_2O_3$ and MgO. Fe_2O_3 existed at 1400° C. and the MgO remaining after formation of $MgO.Fe_2O_3$ existed as free magnesia. In a second mixture containing 37.7 per cent. CaO, 49.7 per cent. Fe_2O_3 and 12.6 per cent. MgO, calcium ferrite and magnesium ferrite were likewise formed at 800° C., but the formation of calcium ferrite increased and the formation of magnesium ferrite decreased as the temperature rose. The magnesium ferrite is converted into $2CaO.Fe_2O_3$ at 1200 and 1400 deg. F. and the magnesia existed as free MgO in the clinker.—Yoshiaki Sanada and Gunkichi Nishi in *Journal of the Society of Chemical Industry, Japan*, 40:16B-17B, January, 1937.

Calcium Ferrite Reactions Investigated

$CaO.Fe_2O_3$ and $2CaO.Fe_2O_3$ were prepared from raw mixtures of $1CaCO_3+1Fe_2O_3$ and $2CaCO_3+1Fe_2O_3$, heated in an electric resistance furnace. $CaO.Fe_2O_3$ was obtained at 1200° C. and $2CaO.Fe_2O_3$ at 1400° C. The clinker was ground in an agate mortar, hydrated with water free of CO_2, in glass bottles at 25° C. thermostat. The $CaO.Fe_2O_3$ did not react with water, but the $2CaO.Fe_2O_3$ reacted with water as follows:

$2CaO.Fe_2O_3+\text{water} \rightarrow Ca(OH)_2+CaO.Fe_2O_3$ aq.—Yoshiaki Sanada in *Journal of the Society of Chemical Industry, Japan*, 40:16B, January, 1937.

Cement Proportions for Lime Masonry Mortar

In the course of an investigation which began in the laboratory of the Pargas Lime Mortar Company in Finland in 1929, originally with the aim of determining what proportion of cement is required to obtain a compressive strength of 50 kg. per sq. cm. for lime masonry mortar, the hypothesis was developed that brick mortar always has a low water-cement factor because the greater part of the water which is not bound by adhesion and capillarity is removed by the suction of the brick. This theory was then tested experimentally. A plastic mortar consisting of two parts by volume

of hydrated lime, one part of cement and nine parts of sand was made into cubical specimens and tested, yielding 21 kg. per sq. cm. Then the same mortar was pressed for one minute between bricks, changing its consistency from plastic to stiff, before being filled into the form. This mortar then yielded strengths of 54 kg. (when tamped into the form by hand) and 94 kg. (when tamped by machine). In further experiments it was found that a plastic mortar loses about 70 per cent. of its water which is not chemically combined, when placed for one minute between two bricks. The suction can of course vary if the bricks are moist; in the tests in Finland the excess water was removed with a Rogers apparatus.

A computation in connection with these experiments showed that in the case of mortars which have given up 50 per cent. of their water content, mortars with 10 parts by weight of lime mortar and one part by weight of cement yield a compressive strength of 50 kg. per sq. cm.—*Tegel*, Stockholm, 1936, No. 8, pp. 182-184, reviewed in *Tonindustrie-Zeitung* 61: 231, March 8, 1937.

Effect of Water on Calcium Hydrosilicates

The hydraulic admixes to cement act not only as fillers, but react with the calcium hydroxide liberated during the setting of the cement, forming calcium hydrosilicates. These new compounds are not stable against aggressive solutions; even pure water decomposes them by hydrolysis, forming silica gel.

The methods for determining free lime in cement clinker are not applicable for the investigation of hardened and trass-bearing mortar, on account of its water content and its physical structure. The values obtained from these methods are higher than the actual ones.

The good effect of trass admixture in concrete work which is exposed to aggressive action consists not in the formation of free lime, but in the formation of calcium hydrosilicates, which under the aggressive action decompose and liberate silica gel. This gel is chemically resistant, stops up the pores of the concrete and thus has the effect of increasing the density of the concrete. — Dr. A. Steopoe in *Zement* 26:169-172, March 18, 1937.

The Canadian Fairbanks-Morse Co., Ltd., with 15 offices in Canada, has been appointed selling agent for Traylor equipment, according to an announcement by the Traylor Engineering & Mfg. Co.

Read the Reports of Other AUTOMATIC users:--

An AUTOMATIC owner writes:
"Our work was completed in three months,—one-half the time we figured necessary"*

Another user says:
"Since putting on your AUTOMATIC we are stripping 50% more material"*

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"I have three operators. They all claim that the AUTOMATIC is the best, by far, of any bucket they ever used."*

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Traffic News Digest

Recent I. C. C. Decisions

Amesite—The commission has denied authority to establish rates on road building material over an intrastate route from Birmingham and Ensley, Ala., to Mobile, Ala., without observing the long-and-short-haul provision of section 4. The route proposed was 51.4% circuitous. Fourth section application No. 16,456. I. C. C., F. S. O. No. 12,765.

Cement—In response to fourth section application No. 16,564 the Commission has denied authority to publish rates on cement from trunk line and New England shipping points to destinations in Boston, Mass., metropolitan district without observing the long-and-short-haul provision of section 4. The relief was sought in an effort to meet competition of imported cement from Europe with proposed rates based on 70% of the distance scale of rates prescribed in New England Cement Rates, 155 I. C. C. 600. Since there was no evidence of cement moving by water to Boston from origins in the United States nor of actual competition by all-water or rail-water routes from points of origin in trunk line in New England territories, it was found that the relief was not justified. I. C. C., F. S. O. No. 12,757.

Crushed Stone, Sand and Gravel—After further hearing the Commission has modified the findings and orders in 169 I. C. C. 334 and 213 I. C. C. 537 to permit defendants to establish a rate of 55c a net ton to expire December 31, 1937, on crushed stone, sand and gravel, from Joliet, Plainfield, McCook and Bellwood, Ill., and Peru, Ind., to Merrillville, Ind. I. C. C. Docket No. 21,894 Lehigh Stone Co. *v.* B. & O. *et al.*

Lime—In response to fourth section application No. 16,545, the Commission has granted authority to establish rates on existing routes from producing points in the Gibsonburg, Cold Springs-Durbin, Marble Cliff, Scioto, O.; Huntington, Mitchell and Logansport, Ind., groups, to destinations in southern territory using the lowest rates that may be constructed over any line or route from and to the same points on the bases prescribed in National Mortar & Supply Co. *v.* Pennsylvania, 216 I. C. C. 75, 216 I. C. C. 781, and to maintain higher rates from, to, and between points subject to the usual intermediate, combination and circuity limitations. I. C. C., F. S. O. 12,759.

Sand—The Commission has awarded reparation on molding sand from Elnora, N. Y. to Gardner, Mass., on finding the rate unreasonable to the extent it exceeded $2.00 a net ton from Ushers, Schuylerville, and Saratoga Springs, N. Y., to Worcester, Mass., and unreasonable to the extent that they exceed $3.80 on silica sand in box cars and $3.40 in open-top cars and the rates from Millville and Manumuskin to Worcester routed via Allentown unreasonable to the extent they exceed $4.00 in box cars and $3.60 in open top cars. I. C. C. Docket No. 27,473, Florence Stove Co. *v.* Boston & Maine *et al.*

Examiners' Reports

Sand—Examiner Leland F. James proposes an award of reparation amounting to $62.63 on a finding that the rate on moulding sand from Cedar Lake and Millville, N. J. to Elmira, N. Y. was unreasonable to the extent it exceed $2.40 a net ton. I. C. C. Docket No. 27,516, Kennedy Valve Mfg. Co. *v.* Central of N. J. *et al.*

Examiner Burton Fuller recommends that the Commission find the rates on sand in open top cars for single line hauls from Phalanx and Warwick, O., to destinations in western Pennsylvania, unreasonable and unduly prejudicial for the future to the extent they may exceed rates made under the West-Penn single line scale based on the single-line distances, hauls to destinations on short lines connecting with the originating carriers to be treated as single-line. He further recommends that the rates on sand in open top cars for joint-line hauls from Phalanx and Warwick, and for both single and joint-line hauls from Geauga Lake and Dundee, O., to destinations in Pennsylvania be found not unreasonable or otherwise unlawful. I. C. C. Docket No. 27,602 Iudustrial Silica Corp. *v.* B. & O. *et al.*

Legislation

Fourth Section Revision—The Chamber of Commerce of the United States is conducting a referendum vote of member organizations to demand the attitude of these organizations toward the Pettengill bill proposing to repeal the long-and-short-haul clause of section four of the interstate commerce act. The transportation committee of the chamber recommends passage of this bill and gives the following reasons for that recommendation. As this is a very concise statement of the various arguments in favor of this legislation it is printed in full.

"The operation of the long-and-short-haul clause in the period since the World War has been clearly unsatisfactory.

"The clause included in the original act of 1887, and amended in 1910, was designed to give the Interstate Commerce Commission special authority over the particular type of rates involved at times when the Commission's general rate powers extended only to maximum rates and not to minimum rates. The situation regarding need for such special authority to pass upon long-and-short-haul rates was fundamentally changed in 1920 when the Commission was given power over minimum rates in one and all cases.

"The fourth section could well be so modified that cases involving long-and-short-haul questions would be settled under other provisions of the interstate commerce act, particularly the provisions of the first and third sections requiring that rates must be just and reasonable and that they must not cause undue or unreasonable preference or advantage to, or prejudice or disadvantage against, any person, locality or description of traffic.

"Most of the present arguments in opposition to any change in the fourth section appears to be based on the assumption that proposed changes would open the way to a revival of the earlier conditions referred to. This assumption beclouds the issue, for, as already pointed out, the powers of the Interstate Commerce Commission over all railroad rates have been greatly extended since those conditions prevailed and there seems no danger of the Commission's permitting a return to them even if the railroads, contrary to their own best interests, desired to do so.

10 to 4000 Tons Daily

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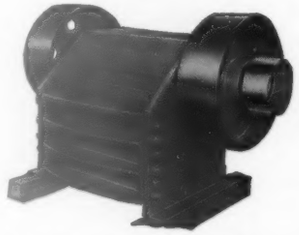

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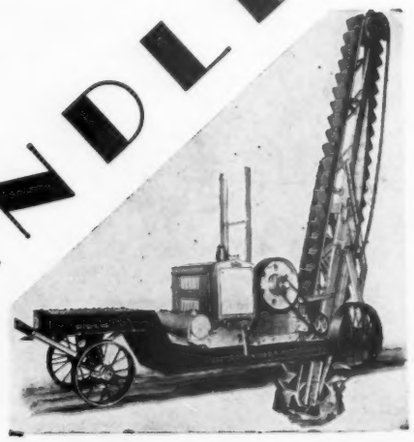

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LOW COST CRUSHING FOR 52 YEARS

"Shipper representatives otherwise favorable to repeal of the fourth section, and confident in the adequacy of other sections of the interstate commerce act to protect all legitimate interests in cases involving long-and-short-haul questions, have expresesd the fear that an undue burden and expense might be placed upon them to prove before the Commission the unreasonableness, prejudicial character or other unlawfulness of proposed long-and-short-haul rates to which they might object. To remove this apprehension a provision has been included in the proposed new fourth section placing upon the carrier the burden of proof to justify the rate or charge for the longer distance against any claim of violations of sections 1, 2, and 3 of the interstate commerce act. With this means readily available to the shipper to require justification before the commission of any proposed new long-and-short-haul rate to which he may object and with the Commission's usual vigilance in such matters, it appears that the interests of shippers and the public will be amply safeguarded.

"It is a fundamental transportation principle that there is no exact measure of the reasonableness of a rate and that carriers of various kinds and in various circumstances should be permitted to adjust their rates within reasonable limits in such a manner as to be able to compete for a fair share of the business. This fundamental principle is violated when a long-and-short-haul clause is applied to the railroads as rigidly as the existing clause has been since 1920. Legitimate competition in transportation is excluded and the producers, distributors and consumers who would benefit by the opening up of the natural competitive channels of trade are discriminated against."

On May 11, Senator Wheeler, the chairman of the Interstate Commerce committee, stated that no hearings would be heard on the Pettengill bill and that there would be no chance of its being enacted at this session of congress.

Rail Pensions—A study of the amount of taxes necessary to provide for the railroad pension agreement by the treasury department indicates that a tax of 2½% would not be sufficient. Rep. Doughton, of the House Ways and Means committee, has introduced H. R. 6048, a bill increasing the rates to 2¾% for 1937 to 3½% for 1946. At hearings on pension legislation it was estimated that fifty million railroad workers would retire the first year the pension system was in effect. It is expected that the tax assessed on the carriers and their employees will take care of all of the requirements of the pension fund including its administrative cost.

Labor Bills—The senate bill No. 69 proposing to limit the length of freight trains to 70 cars was ordered favorably reported by the Senate Interstate Commerce committee without a hearing. While the bill was introduced as a safety measure it is the contention of opponents that it cannot be justified from a safety standpoint but that it is a labor bill designed to make work and that it would operate to injure railroads and drive business from them to competing forms of transportation. The railroads contend that it would be necessary to run 6,225,000 additional train miles each year on the basis of 1936 traffic and that accidents, injuries, and fatalities would be increased particularly with grade crossings. They say operating expenses would be increased about $90,000,000 each year on the basis of 1936 business, which would result in higher freight rates and that economical and efficient use of the existing railroad plants would be impossible. They further point out that additional main tracks, side tracks and yards would have to be constructed to accommodate the additional train units and that lighter engines would have to be provided to avoid the wasteful use of existing engines designed to pull heavier trains. Proponents of the bill are the railroad labor organizations. Active opposition to the bill is developing among various organizations of shippers. The Associated Southwest Country Elevators has sent a letter to members of the association urging them to oppose this bill. This letter states that the freight train casualties have dropped 66% in 14 years while the average length of the freight train has increased 15 per cent. The Great Lakes advisory board is opposing not only this bill but the 6 hour day bill, the full crew bill, the signal inspection bill, proposals for government ownership and the President's proposal for placing the Commission under the Department of Commerce.

On May 17 the senate passed bill No. 29 giving the Commission control over the safety devices of the railroads and providing for the Commission to inspect the various safety and signal devices. The bill has been sent to the house.

Through Routes—The Senate Interstate Commerce committee recommends passage of Senate Bill 1,261 amending section 15, part 1, of the Interstate Commerce Act to give the Commission further power to establish through routes. This legislation was proposed by the Federal Coordinator of transportation.

New Complaints Filed

Amesite—Reparation is sought on an allegation of unreasonable rates on asphalt coated gravel from Mayfair, Ill. to Kalamazoo, Mich. in a complaint filed by H. White, 7 S. Dearborn St., Chicago, Ill., in I. C. C. Docket No. 27,712 Barber Construction Co.,' Chicago, Ill. *v.* M. C. R. R. *et al.*

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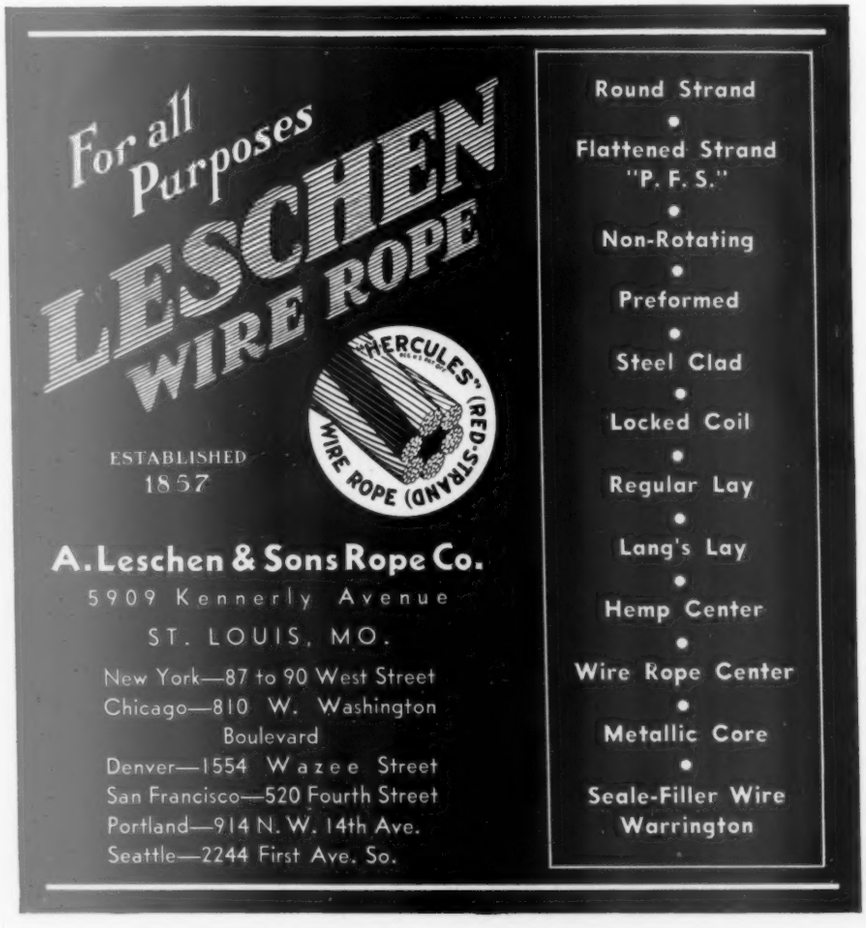
Occupational Diseases and the Law

Wisconsin Decisions

Montello Granite Co. v. Heller et al., decided on April 26, 1937, by the Dane County (Wisconsin) Circuit Court. In this case (according to the court's summary), a partnership of former employees was formed after a temporary shut-down, the men being told that if they wanted their jobs back they would have to enter into some arrangement which would accomplish a release of their rights to workmen's compensation. The partnership was paid a lump sum which exactly made up the wages of the men; there was no expectation of profit and no loss; though there was a lease of the plant, no rental was paid or due; the company kept records of each man's time and the amount due him; a foreman acting for the company hired additional men who thereafter court holds that although the purpose of a partnership is not material if the partnership is valid (*York v. Wisconsin Industrial Commission*, noted in PIT & QUARRY, January, 1937, page 131), in this case the scheme was so devoid of partnership characteristics that no partnership exer existed, and that consequently the "partners" suing in this action to recover disability compensation were employees of the company. The Industrial Commission's awards on that basis are affirmed. The court further denies any constitutional right of a company to contact with its employees for exemption from the Workmen's Compensation Act whereby "men must contract themselves out of disability benefits for loss of health or limb or life."

Universal Granite Quarries Co. et al. v. Industrial Commission et al., decided on April 27, 1937, by the Wisconsin Supreme Court. Here a silicosis award affirmed in the circuit court is reversed by the state supreme court because of a late claim. The finding of the Industrial Commission that the employee did not know until shortly before filing the claim that he had silicosis and its relation to his employment is reversed on the ground that although the employee probably knew nothing about silicosis, he knew about stone dust and that stone dust was causing his trouble, since he had worked for 40 years at the same kind of work; the court holds that it is a matter of common knowledge "that stone dust causes lung trouble," and that failure of the employee to make claim for compensation within two years from the time when he became aware of his trouble and the cause of it bars his claim.

Montreal Mining Co. v. Industrial Commission et al., decided by the Wisconsin Supreme Court, April 27, 1937. This is an appeal from an increased award, based on silicosis disability, to an employee whose employment was terminated by a spine accident which in itself resulted in 30 per cent. disability. The court holds that to support the additional award it would be necessary to show (which the evidence did not) that in the interval between the accident and the time when disability to resume work became apparent, the silicotic condition so increased as of itself to incapacitate the workman.



Trade Literature

How to Handle It with Rex Belt Conveyors. 114 p. Chain Belt Co., Milwaukee, Wis.

The Loomis K-4 Clipper. 4 p. Loomis Machine Co., Tiffin, O.

Metalastic Packings. 16 p. Metalastic Mfg. Corp., Hackensack, N. J.

Clyde Steam Hoists. 20 p. Clyde Iron Works, Duluth, Minn.

Fairbanks-Morse 42-E Diesel Engine. 4 p. Fairbanks, Morse & Co., Chicago, Ill.

The New IA-55 Jackhamer. 4 p. Ingersoll-Rand Co., New York, N. Y.

Dual Ventilated Fan Cooled Type CS Squirrell-Cage Motors. 4 p. Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Vacuum Filtration—Vacuum Thickening. 16 p. Oliver United Filters, Inc., New York, N. Y.

Dust Control by Sly. 16 p. W. W. Sly Mfg. Co., Cleveland, O.

Powertrax—Mobile and Stationary Industrial Power. 24 p. International Harvester Co., Chicago, Ill.

Fairbanks-Morse Fig. 5870 Centrifugal Pumps. 4 p. Fairbanks, Morse & Co., Chicago, Ill.

Waytrol . . . for Accurate Weighing, Feeding, Batching, Proportioning. 8 p. Jeffrey Mfg. Co., Columbus, O.

Patterson Pebble and Ball Mills. 32 p. Patterson Foundry & Machine Co., East Liverpool, O.

Dust Collectors. 36 p. C. O. Bartlett & Snow Co., Cleveland, O.

Haiss Buckets for Rehandling. 4 p. *Haiss Hi-Power Buckets.* 4 p. George Haiss Mfg. Co., New York, N. Y.

High Intensity Mercury Lighting. 32 p. Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Concrete by Pipeline with Rex Pumpcrete. 48 p. Chain Belt Co., Milwaukee, Wis.

Welding by Smith. 4 p. S. Morgan Smith Co., York, Pa.

Double-Suction Horizontally-Split Centrifugal Pumps. 4 p. Morris Machine Works, Baldwinsville, N. Y.

Material Handling Problems Solved with "American Eagle." 4 p.—American Hoist & Derrick Co., St. Paul, Minn.

The "Cement-Gun" and Its Sand-Cement Product "Gunite." 66 p. Cement Gun Co., Allentown, Pa.

The Pipe Line That Travels. 4 p. Johns Conveyor Corp., New York, N. Y.

"Steel-Clad" Motor Control. 16 p. Electric Controller & Mfg. Co., Cleveland, O.

Tips on Cable Uses. 4 p. General Electric Co., Schenectady, N. Y.

Incorporations

DEXTER SAND & GRAVEL CO., Ann Arbor, Mich. Capital $60,000.

GRAY'S LAKE SAND & GRAVEL CO., Gray's Lake, Ill. Capital 150 shares n.p.v. Correspondent: Joseph N. Sikes, Waukegan National Bank Bldg., Waukegan, Ill.

DOW FELDSPAR CO., Jerseyville, Ill. Capital 100 shares n.p.v.

PUGH QUARRY, Custer, O. Capital $25,000. Correspondent: William J. Hunter, Upper Sandusky, O.

PACIFIC CONCRETE BRICK & TILE CORP. Capital $250,000. Correspondent: Helen H. Norris, 2108 Vicksburg Ave., Oakland, Cal.

DOWNEY TILE MFG. CO., INC., Los Angeles, Cal. Capital $50,000.

CERTIFIED CONCRETE, INC., Muskegon, Mich. Capital $30,000.

THE BOULDER ROCK CO., Los Angeles, Cal. Correspondent: J. D. Taggat, 615 Richfield Bldg., Los Angeles, Cal.

SIEVERS SAND & GRAVEL CORP., Elizabeth, N. J. Capital $50,000. Correspondent: Christopher Sievers, Jr., Elizabeth, N. J.

ALL FLORIDA SAND CO., Orlando, Fla. Capital 100 shares n.p.v. Correspondent: G. B. Fishback, Orlando.

LICKING GRAVEL CO., Newark, O. Capital $50,000. Correspondent: George J. McDonald, Trust Bldg., Newark, O.

WOOD RIVER SAND & MATERIAL CO., Wood River, Ill. Capital 400 shares p.v. Correspondent: Everett B. Dodd, Wood River, Ill.

CONSUMERS SAND & GRAVEL CO., Wilmington, Del. Capital 5,000 shares n.p.v. Correspondent: J. P. Murray.

PARKSIDE WATERPROOF CEMENT BLOCK CO., Chicago, Ill. Capital 200 shares n.p.v. common. Correspondent: Joseph D. Motto, 29 So. LaSalle St., Chicago, Ill.

The extra STRENGTH is in the Spiral

THE once necessary evil of using *heavier* pipe than was needed in order to obtain the required *strength*, was wiped out when Taylor Forge pioneered spiral pipe.

That spiral seam makes it possible to produce a pipe that is light walled, and therefore less expensive to buy, ship, and use—yet strong in every way, thanks to the spiral reinforcement which stiffens it from end to end—holds it round and true against collapsing strains—gives it bursting strength even beyond that of a seamless tube of equal gauge.

You simply choose the gauge you need for the job, never paying a penalty for superfluous weight. Let it cut the cost of water, sand and gravel lines. Ask for the new Catalog 36.

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New efficiency in screening has been achieved by the development of such outstanding features as:

Solid counter-balanced shaft
Resilient rubber mounting
Completely protected bearings
Four-way tension screen cloth
Double crowned deck surface

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New Machinery and Supplies

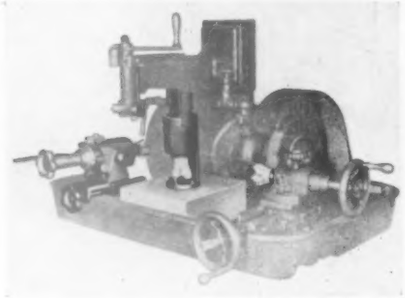
Bit-Grinding Attachments Fit All Detachable Bit-Grinders

The Sullivan Machinery Co. announces new detachable-bit grinding attachments for use on the various types of detachable-bit grinders now on the market.

The Sullivan detachable-bit with the unusual design of broad chopping or reaming edges and single cutting edge necessitates a different grinding method from that used on the conventional detachable bit.

The new attachment consists of a holder for loading, a barrel with an expansion collet for gripping the bit, and a rocking sleeve mounted on an adjustable base.

Alignment is obtained by the cutting edges of the bit resting between two bars of the



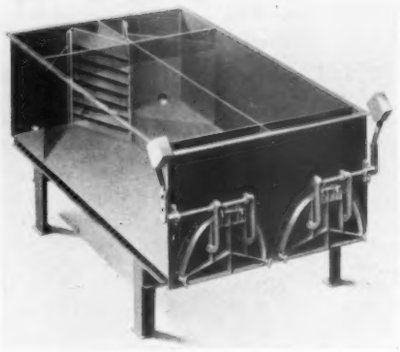
Detachable-bit grinder.

loading fixture and bit holder inserted in the loading casing. The alignment is automatic; as the expansion collet tightens to grip the bit the holder slips into alignment stops. The holder is then inserted into the rocking sleeve with rocker rolls contacting the radial cams while a dowel pin fits into groove on the sleeve to insure true grinding. A rocking of the holder grinds the reaming edge and one side of the cutting edge. The rocker rolls contact the radial cams during the entire grinding operation so that the bit is in proper contact with the grinding wheel to produce a straight cutting edge. The holder is then revolved 180 deg. and the same simple operation is repeated and the bit is ground. The gauge is ground by the same method as utilized on the various types of machines.

New Dewaterer for Multi-Wash Dust Collectors

The new Schneible rectangular tank multi-louver dewaterer is made for use in smaller systems of multi-wash dust collectors where the quantity of water and sludge produced does not justify the use of the larger capacity truck-type dewatering tank or the still larger concrete rectangular tanks.

This unit is made for setting directly on the floor or on steel legs as conditions require. The tank is made with a divider down the center separating it into twin tanks for alternate use. At one end is the sludge and water-inlet distributor trough just inside and above the sludge discharge gates. At the opposite end are located the weir, skimmer walls, the multi-



Rectangular tank dewaterer.

louvers, and the recirculating and dewatering outlets.

Sludge and water from the multi-wash collector is piped to the dewatering tank and enters at the closed end through the inlet-distributor trough which directs it into one of the sections of the tank. The maker claims that, as the sludge and water flow into the tank, precipitation of solids immediately takes p'ace, the skimmer wall holding back floating material as the clear water flows over the weir from where it is pumped back for reuse for dust collection.

The low velocity of water in the tank allows for complete precipitation of the solids in the area around the multi-louver vanes. When one of the tanks is sufficiently filled with precipitated material, the inflow water is switched to the other section of the tank by means of the inlet distributor trough allowing for an additional precipitation period. After complete settling, the valve on the line leading to the interior of the loaded tank is opened and the head of water in the tank is allowed to recede slowly. The water flows out of the precipitated material and does not carry the material with it due to the angle of repose of the silica sludge against the multi-louver vanes.

The final draining period reduces the moisture contained in sludge down to approximately 20 per cent. or lower. Then the sludge in the dewatered tank is completely drained, the discharge gates are opened and the sludge is pushed out into a convenient receptacle for disposal.

Patents Cover Process of Making Masonry Cement

Considerable success has been achieved in the development and use of Blank-processed masonry cement, patents of which are controlled by the Cement Process Corp., 90 Broad St., New York, N. Y.

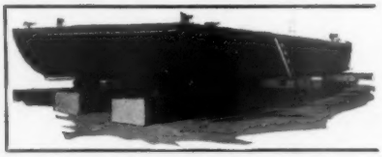
Under the Blank process caustic lime is hydrated in the presence of siliceous or argillaceous materials, and the finely divided and reacted mixture is then ground to the desired fineness under controlled moist-heat conditions to yield modern masonry, plastering and stuccoing cements. Advantageously, a small proportion (8 to 10 per cent.) of Portland cement clinker may be ground in under the controlled processing conditions, but is not essential to the production of a useful product. The proportions of the materials used, together with the control exercised during the processing procedure of manufacture, are dependent upon the kinds of materials available at the source of manufacture and upon the type of product it is desired to produce. Any number of products may be produced for special masonry constructions as well as all-purpose products for general use in all types of masonry work. Manufacture of all-purpose masonry cements may be carried out in the normal lime or cement plant with little or no alteration to existing equipment, thus enabling the local consumer to obtain a high quality product without paying the high freight rates heretofore involved when it has been necessary to obtain such a product from producers situated at a distance from the point at which it is desired to carry out a given construction, and with complete assurance as to the quality of the product.

Blank-processed masonry cement is being manufactured and sold in the United States, Mexico and Central America under the trade name "Plastocement." A Blank-processed cement for all-purpose use and particularly adapted for use in situations where Portland cement has heretofore been used is being manufactured in Mexico under the trade name "Atoyac."

Electrostatic Precipitator for Industrial Air-Cleaning

A new electrostatic precipitator for general industrial air-cleaning with high operating efficiency has been announced by the Pangborn Corp. of Hagerstown, Md. The unit is particularly suitable for salvaging valuable

6 big reasons for choosing
AMERICAN STEEL BARGES



1. American Steel Barges are portable—they are built in sections for quick assembly in the field.
2. American Steel Barges and hulls are economical—built to suit your requirements.
3. They have a longer service life than wood construction and in addition have a high resale value.
4. All steel riveted or welded construction is sturdier than wooden construction.
5. The all steel construction eliminates much of the expense of maintenance.
6. American Steel Barges provide more safety for carrying your machinery or material.

It will pay you to investigate the advantages of American Steel Floating Equipment.

AMERICAN STEEL DREDGE COMPANY
INCORPORATED
FT. WAYNE INDIANA

New electrostatic dust precipitator.

dust, mass air cleaning, or removing objectionable particles from gas or vapor and similar applications. It is said to possess the following advantages

1. Small size of unit reduces space requirements and cost and permits a complete factory assembled unit.

2. Small vacuum-tube power-pack attached directly to precipitator cabinet eliminating the usual separate room for high voltage generating equipment.

3. Discharge air does not contain appreciable amounts of ozone nor oxides of nitrogen and may be breathed without irritation of the membranes.

4. May be designed for efficiencies as high as 99 per cent. (by weight) and to remove particles as small as one-fifth micron.

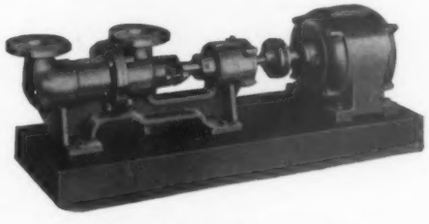
5. Operates at lower voltages permitting use of electronic tubes of standard industrial classification and with lower power consumption.

6. Low and constant air-flow resistance through the unit resulting in reduced power and uniform air volume.

In general, the complete unit consists of three parts: collector cells, ionizing assembly and power pack. These may be furnished assembled in a standard cabinet or as parts for assembly in existing duct work or special cabinets.

New Self-Priming Pump Is of Valveless Design

Robbins & Myers, Inc., recently added a line of pumps to the list of devices manufactured by the firm, having become exclusive licensees of the Moineau pump patents in the United States and Canada.



Moineau self-priming pumping unit.

The Moineau pump is of unique design and has unusual adaptability. It consists of positive pressure rotating piston revolving in a helical stator. It has exceptional characteristics in that it is valveless yet self-priming to within 1½ in. of mercury barometer. Its flow is uniform, and it is claimed that it will "pump anything that will flow in pipes."

It is particularly recommended as being practically unchokable, and will handle from 25 to 35 per cent of solids suspended in liquids. Because of its simplicity of construction, its ability to handle without difficulty materials that have been troublesome with other types of pumps, and the ease of renewal of parts, it has found wide application in England and continental Europe.

Flexible Conveyor Unit on Elevating Wheel Truck

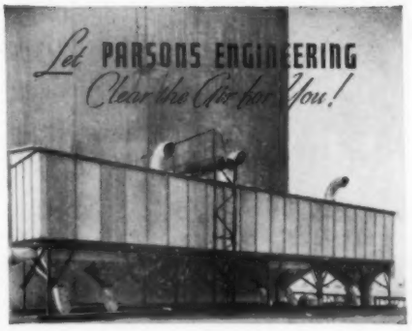
A substantial saving in handling costs is being effected by many pit and quarry operators through the use of a new flexible conveyor arrangement offered by the Portable Machinery Division of A. B. Farquhar Co., Ltd., York, Pa.

This conveyor, Model 347, is designed so that it can be mounted on an elevating wheel

Model 347 conveyor assembled on mast-type elevating wheel truck.

Conveyor installed at loading plant.

A typical pit installation.



A 15-year record of repeat business would imply that sound Parsons engineering is worthy of *your* investigation, too. Parsons' patented oval bag principle, long life, low dust count and minimum maintenance enable Parsons Dust Arrestors to excel in the cement industry. Write for our Bulletin DA-6.

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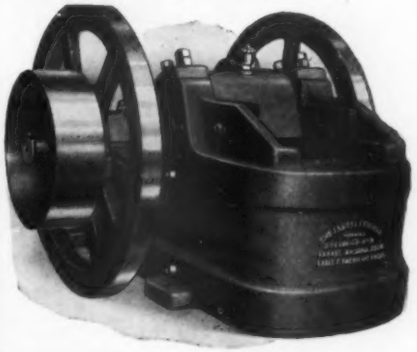

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UNI-WELD MANGANESE PIPE is made of special analysis steel designed to resist abrasion. Its long service life represents years of Built-In improvements.

Light in weight, Sturdy in design, Resistant to abrasion and Guaranteed to stand up. Can be furnished in diameters from six inches up, with hooks, tapers, gates or other special features. Write for details.

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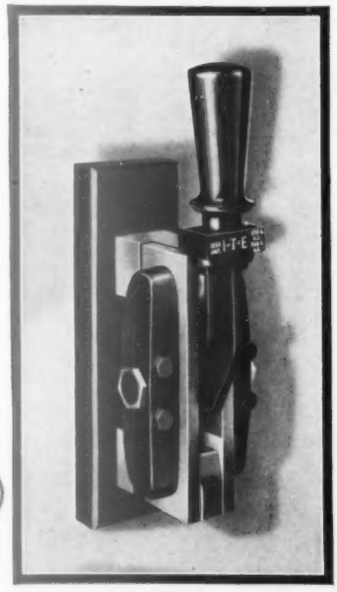

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KLAMP-TITE *Switch*

Recognized as a marked improvement in knife switch construction, the KLAMP-TITE holds its contacts under thousands of pounds constant pressure. One throw of the handle completes closing and clamping action.

An ideal switch for DUSTY installations

KLAMP-TITES add safety in cement plants and allied industries where dependability is law. *Send for Bulletin 1136.*

I-T-E CIRCUIT BREAKER CO.
Philadelphia, Pa. Dept. R *Offices in Principal Cities*

This 31,000-lb. shipment of machinery ready to leave the Allis-Chalmers plant at Milwaukee for Grand Coulee Dam consists of three double-deck 5-ft. by 10 ft. vibrating screens. Each screen is to handle 600 tons per hour of combined crushed and pit-run gravel up to 7-in. maximum size.

truck, it can be mounted on wheels or casters for horizontal conveying where portable units are required, or it can be installed on stationary supports. Length can be readily increased or decreased to suit each particular handling condition, as the conveyor is made up of independent sections. The conveyor can be dissembled and readily moved from one location to another, to be reassembled in whatever form is most suitable for the changed requirements.

An operator may start with a minimum of equipment and later acquire additional sections, mountings or accessories to be used in conjunction with the units originally purchased.

The illustrations show how easily the changes may be effected, and the various mountings by the purchase of a few accessory parts.

In keeping with its policy continually to improve its products to meet constantly changing conditions, the Farquhar company has increased its engineering staff and installed additional production machinery.

The company will be glad to supply additional information concerning this cost-reducing handling method.

Six-Cylinder Truck Rated to Carry Eight Tons

Rated at 16,000 lbs. gross, the new Model EJ, just announced by Mack Trucks, Inc., is the lightest truck yet built in the regular Mack line.

Adding greatly to the modern appearance of this new truck is the cab. It embodies the latest features in safety, comfort, and appearance. Roof construction is all-metal. The windshield is sloping, thus reducing glare. Safety glass is standard throughout. Standard interior fittings of the cab include a dome light, coat hooks, and an instrument board with clock-like instruments which is indirectly lighted. Gasoline tank capacity is 20 gallons.

Modern lines feature this new truck.

The model EJ is available in four wheelbase sizes ranging from 146 to 194 in. Three tractor wheelbases are available ranging from 139 to 158 in.

A six-cylinder engine with 3½ in. by 5 in. bore and stroke is used. This engine has a piston displacement of 288 cu. in. and develops 84 hp. at a governed speed of 2800 r.p.m. The crankshaft has seven bearings and cylinder blocks are of chrome nickel.

Salem Buckets Undergo First Radical Change in 60 Years

A notable improvement in the design and construction of Salem steel elevator buckets is announced by the Link-Belt Co.; probably the first radical change in 60 years.

The new bucket is reinforced at the digging lip, front corners and along back. Additional strength and greater resistance to abrasive wear and distortion are claimed for this construction, without increase in bucket weight.

The reinforcing lip is an integral part of the metal body, folded over and spot-welded along the front edge. It is not a separate band.

Front and back views of the super-Salem bucket.

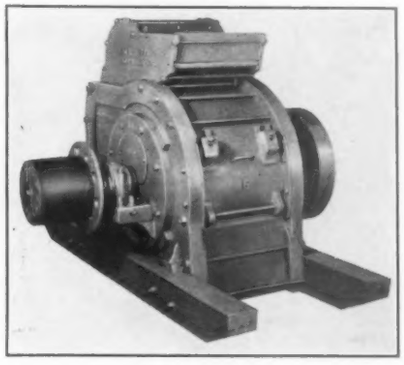
The back reinforcing plate also is spot-welded to the metal body. As no rivets are used, there are no rivets to wear away in service; to interfere with chain attachments; or to damage the elevator belt. It is unnecessary to use washers on the bucket attachment bolts, since the entire back of reinforcing plate presents a flat, smooth surface.

These "super" Salem buckets, made in 2½ in. by 2½ in. to 30 in. by 8 in. sizes, are interchangeable with the old, and in No. 24 and No. 18 gauge are said to be comparable to "heavy" construction of the conventional standard Salem design.

Roller Bearings on New Swing-Hammer Type Crusher

The No. 70, Model JR pulverizer, or swing-hammer crusher, has recently been placed on the market by the Day Pulverizer Co. of Knoxville, Tenn.

This pulverizer has a feed opening to take a "man size" stone (12 in. by 21 in.). It has a capacity of from 15 to 30 tons of finely-



Swing-hammer pulverizer for fine grinding.

ground agricultural lime per hour. The capacity when producing 2-in. materials and smaller ranges from 25 to 50 tons per hour.

SKF double-roll self-aligning roller bearings are standard on all these machines. Hammers are made of manganese steel and the grates are composed of high-carbon tool-steel bars which may be used on both sides, as well as separated for various sizes of materials.

The approximate weight of the pulverizer on skids is 10,000 lbs. Elevators for the machine may be furnished in any desired length.

Although used extensively for the production of agricultural lime, the No. 70, Model JR machine is used frequently for the production of road materials, chips, etc.

Several smaller new models of Day pulverizers have recently been placed on the market. These range in capacities of from 3 to 50 tons per hour, depending upon conditions.

Hour Meter Standard Equipment on Diesels

Henceforth an hour meter will be standard equipment on all 3-, 4-, and 6-cyl. Diesel engines produced by the Caterpillar Tractor Co., according to an announcement made recently.

This meter was made available as an attachment about two years ago. The many that have been used during this period, have definitely proved the value of such an instrument and its use will eventually mean as much to the Diesel engine owner and operator as the speedometer does to the automobile owner.

The hour meter is a sturdy, durable unit with a large dial that is easy to read. It is attached to the rear of the fuel injection pump housing and is driven by the end of the shaft, fitting between the heads of the cap screws in the end of the fuel injection pump camshaft. The hour meter registers one number for every hour the engine operates at standard rated speed.

Just as the mileage-indicator part of the speedometer has become the standard for measuring the life and maintenance intervals of the automobile, so will the hour meter be generally used as a guide for lubricating and maintaining the Caterpillar Diesel engine

Automatic Self-Alignment Feature of Magnetic Clutch

A new type magnetic clutch to be called the Style E is announced by the Stearns Magnetic Manufacturing Co., Milwaukee, Wis. The new clutch is recommended for universal dry or wet application and is of compact, simplified design which makes it particularly suitable for machine tool and similar operations.

Automatic self-alignment at all times is a distinctive feature. The cage floats around the friction elements and thereby eliminates

The Style E magnetic clutch.

possibility of uneven wear on any part of the unit, results in quick release and smooth, even engagement over a long period of service and is not appreciably affected by lining wear.

Absence of push rods through the principle of the floating clutch cage allows greater freedom of action and avoids binding in the friction elements. Another important feature is the simplified latch-and-groove lock design which provides easy adjustment in a few moments with no tools necessary, and is effected by depressing the latch, indicated by an arrow, and turning the armature member to the next notch, thus restoring the original air gap. This feature applies to sizes 6 in. and larger.

New 60- and 90-HP. Diesel Engines Available

A new Fairbanks-Morse Diesel engine known as Model 42-E has been developed to meet the demand of small power users for a heavy-duty, continuous-service stationary engine. It is available in two- and three-cylinder combinations with ratings of 60 and 90 hp. at 450 r.p.m., and can be furnished for direct-connected, belt or electric generator drive.

With an 8¾-in. bore and 10½-in. stroke, this Diesel engine is smaller and lighter than the F-M Model 32-E, but it embodies all of the proven features that have led to the daily use of several hundred thousand horsepower of the larger engines. It is small enough to be installed where space and head room are lim-

DIXIE

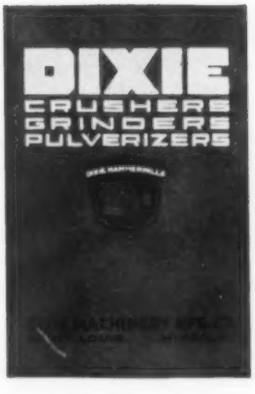
NON-CLOGGING

HAMMER MILL

• FORTY • SIZES •

is the only crusher with a super-tough moving breaker plate that is 26 times the average area. The result is maximum crushing power with minimum maintenance. That is why DIXIE gives record low costs in producing uniform, cubical material.

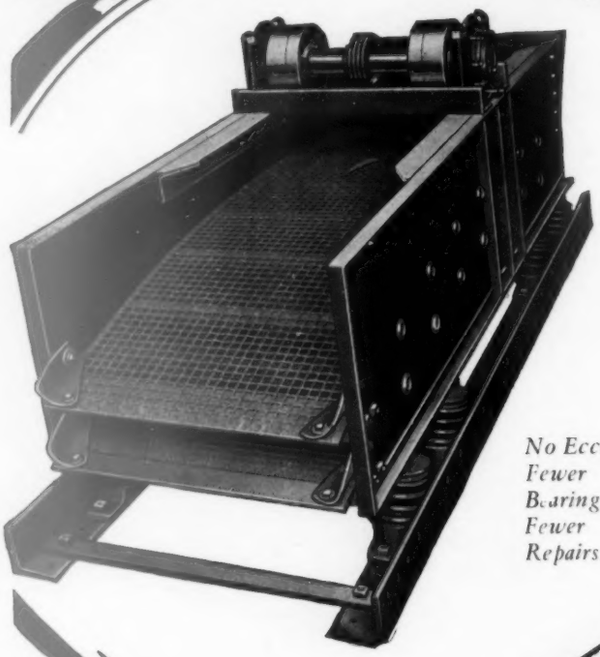
Built in 40 different sizes for all requirements in Primary, Secondary and Fine Reduction. Write for your copy of the Dixie Catalog, which gives full details and specifications.



DIXIE MACHINERY MFG. COMPANY

4209 Goodfellow Ave., St. Louis, Mo.

Plat-O Screens stand close inspection



No Eccentrics, Fewer Bearings, Fewer Repairs.

The soundly engineered application of the unbalanced flywheel type of vibrating mechanism, **as used in the PLAT-O VIBRATING SCREEN**, has eliminated the use of eccentric shafts with their multiplicity of bearings and excessive costs in labor and material for replacements. The rugged, heavy Plat-O Vibrating Mechanism—heart of the Plat-O Screen—revolves in **only two** oversize S.K.F. self-aligning spherical roller bearings. Repairs?? Plat-O Screens are gluttons for punishment. Ask any Plat-O user.

1. **Extra rugged construction**
2. **Free from bearing trouble**
3. **Adjustable vibration or throw**
4. **High speed eliminates binding**
5. **Spring mounted, no vibration to supporting structure**
6. **Oil lubrication, no grease**
7. **Combined sifting and vibrating action means high capacity**
8. **Ideal for medium or coarse screening**
9. **Flat screening angle and minimum headroom**
10. **Long screen cloth life, no whipping**
11. **Screen cloths easily changed**
12. **NO ECCENTRICS, FEWER BEARINGS AND FEWER REPAIRS**

DEISTER MACHINE CO.

1933 E. Wayne Street **Fort Wayne, Indiana**

Emil Deister, Sr., Pres.; I. F. Deister, V. Pres.

Emil Deister, Jr., Secy.-Treas.

Small Diesel engine.

ited, and it is applicable for any power requirement within its horsepower ratings.

It is characterized by extreme simplicity of design and operation. Two important principles, direct, airless injection of fuel and two-cycle design with crankcase scavenging, result in use of an absolute minimum of moving parts. This, along with a medium-low speed, of course means greater reliability and lower maintenance cost.

The power impulse on each downward stroke assures a uniform output without need for an abnormally large flywheel. Cylinder heads are simplified by the elimination of air inlet and exhaust valves with their attendant operating mechanism. All working parts are enclosed, yet are readily accessible for inspection and maintenance.

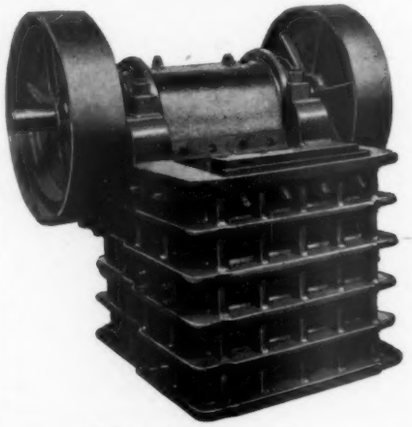
Light Weight Is Feature of New Jaw-Type Crusher

The old 24-in. by 36-in. Blake-type crusher weighed between 60,000 and 80,000 lb. The New Pioneer 24-36 jaw crusher weighs only 32,000 lb.

Neither strength nor capacity has been sacrificed in bringing out the new lightweight machine, however, according to the Pioneer Gravel Equipment Mfg. Co., Minneapolis, Minn. The saving in weight was accomplished (1) by the use of electric cast-steel frame and pitman instead of cast iron, (2) use of an overhead eccentric instead of the swinging jaw, separate pitman and bottom eccentric and (3) a safety toggle-plate which protects the crusher frame against breakage.

The new crusher uses SKF self-aligning anti-friction bearings. Adjustment is by means of an adjusting lever which raises or lowers the pull wedge until the desired opening is obtained. It is not necessary to stop the crusher to change the adjustment.

The crusher operates at a speed of 240 r.p.m. The power required is from 70 to 100 hp. Flywheels are 50 in. in diameter with 12-in. faces.



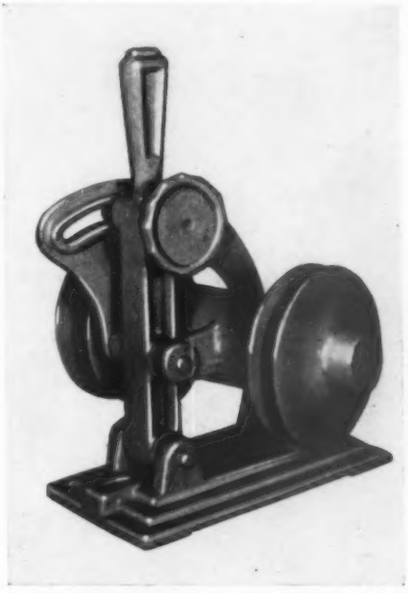
Light weight jaw crusher.

Speed-Control Mechanism Uses Adjustable V-Pulley

The "Hi-Eff" vari-speed control shown in the illustration is introduced by the Columbia Vari-Speed Co. of Wheaton, Ill. It incorporates the adjustable V-pulley principle in a new single-shaft design.

The transmission consists of a single shaft in which are two adjustable V-belt pulleys, which vary in diameter as their distances from the driving and driven pulleys are changed.

It offers infinite speed selectivity within ratios of 5 to 1, and tests show it to be over 90 per cent. efficient.



Variable-speed control device.

The distinctive features of this transmission are said to be: single-shaft design, compactness, efficiency, economy, only one place to lubricate, self-centering compensatory pulleys, ease of installation, and the use of standard V-belts. It is offered in sizes from ¼ to 7½ hp.

Induction System Insures Uniform Fuel Delivery

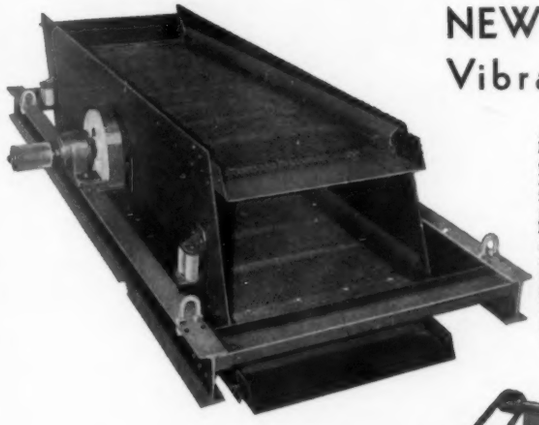
A new fuel-induction system for internal-combustion engines has recently been patented by Continental Motors Corp. This new feature, which assures uniform delivery of fuel to each cylinder, is now being incorporated in the majority of Continental engines.

By dividing the fuel mixture for the various cylinders, before making any horizontal bends in the intake manifold, each cylinder receives the same amount of fuel, thereby eliminating roughness due to uneven power strokes. The split manifold which is used, eliminates the disturbing influences of centrifugal force and a balanced mixture of uniform density is obtained.

Magnetic Unloader Gives Automatic Compressor Control

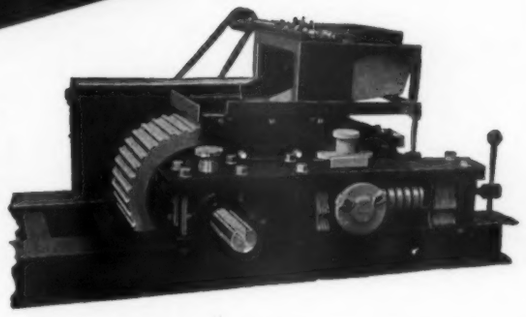
Automatic start-and-stop control, combined with automatic loading and unloading, can now be obtained without additional equipment on motor-driven single-horizontal compressors, by using the magnetic unloader introduced by Worthington Pump & Machinery Corp., Harrison, N. J. No extra piping, valves or other devices are required.

CIRCLE THROW
—the Newest
NEW HOLLAND
Vibrating Screen

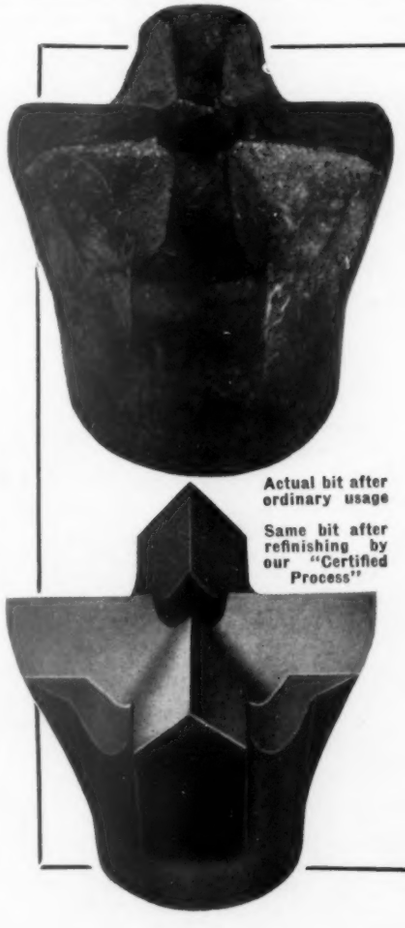


An advanced design that brings lower costs, larger output and longer service life. Balanced for variation in loads and speeds. Capacities up to 100 tons per hour—extension chutes and rubber mountings are standard—100% safety factor in the rotary mechanism. Ask for Bulletins on the New Holland Line of Screens, Crushers, Portable and Stationary Conveyors.

New Holland Roll Crusher with pulsating feeder to double capacity. Rib shell construction increases angle of grip and reduces dust—investigate the advantages of this modern Roll Crusher.



NEW HOLLAND MACHINE CO.
New Holland, Penna.



Actual bit after ordinary usage

Same bit after refinishing by our "Certified Process"

100% EFFICIENCY
in New Method of Resharpening Bits

Get 100 per cent efficiency from our new, perfected method of resharpening bits, and save enough to justify shipment from any part of the country. Here is what our process does for you at a small fraction of the cost of buying new bits.

Each bit is normalized to take out strains in the steel from previous drilling. It is machined to its original cutting edge and clearance angle, one size smaller in gauge. The bit is hardened by reheating in a Pyrometer-controlled furnace, thereby eliminating guesswork, then it is coated with adhesive oil to prevent rusting and packed in a box marked for size and make.

FREE OFFER: Send us a few of your worn bits. We will recondition and resharpen them and return them to you, good as new, without cost or obligation.

ROCK BIT SALES & SERVICE, INC.
2514 East Cumberland St., Philadelphia, Pa.

Ordinary 1½-ton Ford trucks are doing the same job formerly accomplished by 6-ton units, and doing it faster and more economically, at the quarry of the Herzog Lime & Stone Co., Forest, O. The conversions were accomplished through the use of Thornton dual-ratio four-wheel drives, supplied by the Thorton Tandem Co., Detroit, Mich. The view at the left shows a shovel loading a truck in the quarry. The center view shows the truck dumping to the crusher. At the right a 7-ton load is going upgrade. The company has just taken delivery on its fourth unit.

This device operates on standard electric equipment and can be installed wherever a conventional automatic starter is used for controlling the compressor motor. The only other provision necessary is a pressure switch to operate a pilot circuit. The pressure switch control is transferred electrically from the motor starter to the magnetic unloader, and either position may be selected at will. If connected to the motor starter, the compressor starts and stops on the demand for air. When connected to the magnetic unloader, the compressor runs continuously and simply loads and unloads, depending upon whether or not air is needed. If desired, the cooling water supply can also be automatically controlled.

Flexible Coupling for Fractional Horsepower

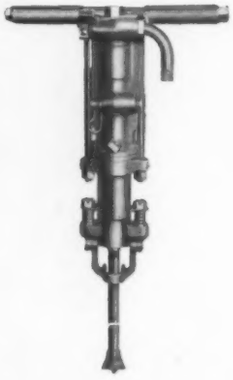
A new Francke all-steel fractional horsepower flexible coupling has recently been developed by the John Waldron Corp. of New Brunswick, N. J.

The new coupling is recommended for fans, fuel pumps, generators, etc. up to ¾ hp. power at 1,800 r.p.m. and for shafts up to ¾ in. diameter. It provides free and independent lateral floating of the connected shafts, accurate alignment surfaces, an assembled one-piece all-steel center member, large load carrying surfaces, is torsionally resilient, mechanically flexible and silent at any speed. It is fully described in Francke Bulletin No. 53, a copy of which will be sent to any reader by the company upon request.

Small all-steel flexible coupling.

Large Jackhammer Added To Line for Hard Rock

The Ingersoll-Rand Co. has recently introduced a new 55-lb. Jackhamer called the JA-55. This machine, a big brother to the JA-30 and JA-45 Jackhamers, is a hard hitting, fast drilling tool designed especially for harder rock and deeper holes.



The JA-55 jackhammer drill.

It is especially suitable for mine, quarry and contract work. Having a low air consumption, because of an improved valve design, it is popular for use with portable air compressors and where the air supply is limited.

The Thermal Expansion of Typical American Rocks, a 36-p. illustrated bulletin by John H. Griffith, may be obtained free of charge upon request to the Director, Iowa Engineering Experiment Station, Iowa State College, Ames, Ia. The author has selected for study about one hundred typical American rocks of the type commonly used for building purposes. For these rocks, there are listed values for the coefficients of linear thermal expansion.

For silica-bearing rocks, the expansions appeared to be dependent upon the amounts of free silica in the rocks, those with the maximum of free silica expanding the most.

The above tractor-trailer is a development of the Trailer Co. of America and is known as the Model H 41 Trailmobile. The trailer has a capacity of 10 tons; the tractor is an International. The welded, all-steel body was designed with a low center of gravity for safe operation on rough terrain.

The Arrow Rock Co. of Los Angeles recently placed this Ford V8 truck in service. It is fitted with special chain-driven axles and payloads up to 20 tons are hauled. A two-speed axle is used as a "jack-shaft" with sprockets mounted on each side in place of wheels. An over-and-under transmission gives 24 forward speeds.

WILLIAMSPORT

PURPLE STRAND "Form-Set"

HELPS TO KEEP ROPE-COST DOWN

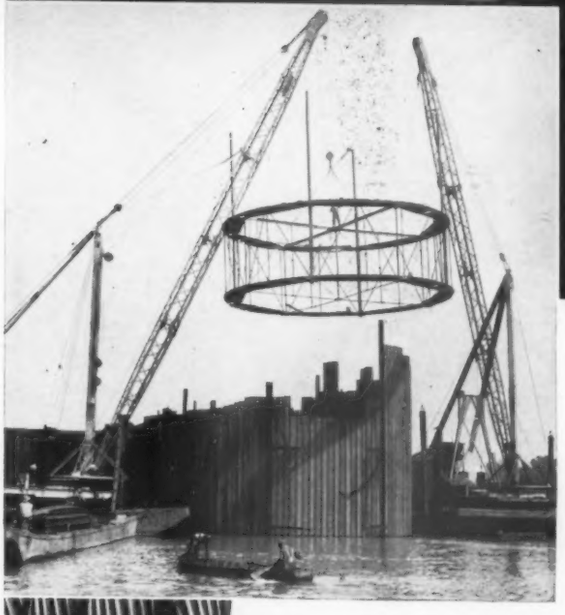


figure your Costs and Work Completed . . . then figure your Savings from using "Form-Set", Preformed the Williamsport way.

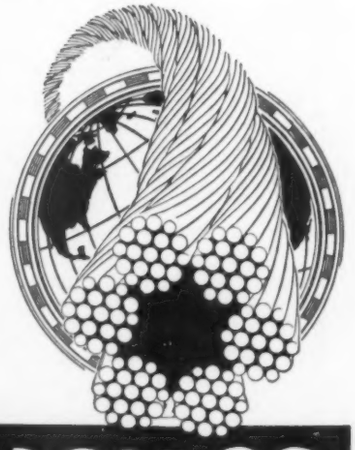
A wire rope that does more work at less expense saves you money. That's obvious, isn't it? Well, Williamsport "Form-Set" is made to do just that: to handle more work at less maintenance cost.

Save . . . Save on every installation. Our method of Preforming makes "Form-Set" easier to handle, goes up quicker.

Save in service, because "Form-Set" runs smoothly and evenly through your sheaves, works swiftly.

Save on replacements. For toughness and dependability, YOU CAN'T BUY a better rope than our Purple Strand "Form-Set". Compare it, for work and for wear . . . learn why it often brings you a profit that simply can't be brought-in with a lower priced rope.

In sending for your rope manual, mention your equipment.



WILLIAMSPORT WIRE ROPE CO.

Williamsport, Pa. 122 So. Michigan Ave., Chicago, Ill.

Other Offices in All Principal Cities

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

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*Warren Brothers Roads Co.

Agitating Ladders (Dredge)
*Eagle Iron Works

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*Hardinge Co.
*Manitowoc Engineering Works
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Aggremeters
*Erie Steel Construction Co.

Air Compressors (Portable)
*Fuller Company
Hardsocg Wonder Drill Co.
*Ingersoll-Rand Co.

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*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
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Timken Roller Bearing Co.

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*Hendrick Mfg. Co.
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*Link-Belt Co.
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*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

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Bins (Cast Iron)
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*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

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Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Chain Belt Co.
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Brick Machines (Concrete)
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*Link-Belt Co.
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Taylor-Wharton Iron & Steel Co.
Wellman Engr. Co.

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Bartlett & Snow Co., C. O.
*Bucyrus-Erie Co.
*Erie Steel Construction Co.
*Link-Belt Co.
Page Engr. Co.
*Sauerman Bros., Inc.
Wellman Engr. Co.

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*Chain Belt Co.
Cross Engineering Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
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*Jeffrey Mfg. Co.
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McLanahan and Stone Corp.
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*Koehring Co.

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*Bucyrus-Erie Co.
Le Tourneau, Inc., R. G.

Cableways
*American Steel & Wire Co.
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*Calcium Chloride Association

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Car Pullers
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*Link-Belt Co.

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Bartlett & Snow Co., C. O.
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*Robins Conveying Belt Co.
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*Sprout, Waldron & Co.

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*Koehring Co.

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Chicago Steel Foundry Co.
*Eagle Iron Works
*Hardinge Co.
Hetherington & Berner, Inc.
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*Kennedy-Van Saun Mfg. and Eng. Corp.
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*Erie Steel Construction Co.
*Jaeger Machine Co.
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Bartlett & Snow Co., C. O.
*Chain Belt Co.
Cross Engineering Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Sprout, Waldron & Co.

Chute Lining (Rubber)
Goodyear Tire & Rubber Co.

Chutes and Chute Liners
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Cross Engineering Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Classifiers
*Deister Machine Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
Simplicity Engr. Co.

Clips (Wire Rope)
*American Steel & Wire Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

Concrete Breakers (Air)
Independent Pneumatic Tool Co.
*Ingersoll-Rand Co.

Concrete Mixers
*Blaw-Knox Co.
*Chain Belt Co.
*Erie Steel Construction Co.
*Jaeger Machine Co.
*Koehring Co.

Concrete Products Plant Equipment
Quinn Wire & Iron Works
Stearns Mfg. Co.
Universal Concrete Pipe Co

Concrete Slab-Raising Equipment (Mud-Jacks)
*Koehring Co.

Condensers
*Ingersoll-Rand Co.

Cones (Sand-Washing)
Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
*Barber-Greene Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.

* See also information in the 1937 Pit and Quarry HANDBOOK.

TWO HUNDRED MILLION RED SEAL HORSEPOWER

AMERICA'S POWER STANDARD FOR 37 YEARS

At the turn of the century Continental produced the first Red Seal Engine and during the past thirty-seven years millions and millions of Red Seal horsepower have been supplying dependable, economical power for agriculture, industry, transportation and aviation. The Continental Red Seal Engine has become the most famous engine in the world today.

It is significant that today more than three hundred manufacturers use Red Seal Engines as standard equipment. These manufacturers *know* from dynamometer tests, laboratory research and proving ground tests coupled with years of experience in actual operation that Continental Engines are built to "take it"—and built to give a type of husky, rugged performance that cuts both operating and maintenance costs to the bone—with the last word in consistent power delivery.

Regardless of whether you are the man who buys the power equipment or the man who uses it, we believe you will be interested in the many engineering features such as individual porting which make Continental Engines so outstanding. We will gladly send you complete information without obligation. Write to

Continental Engines are used as standard equipment by more than 300 manufacturers. Below are a few of the many applications of Continental Dependable Power.

•

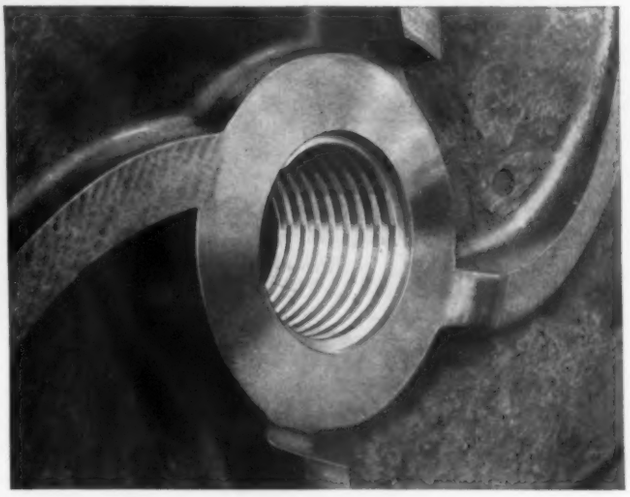
Conveyors
Ditchers
Drag Lines
Electric Generators
Electric Light Plants
Electric Welders
Excavators
Farm Tractors
Graders
Grinders
Harvesters
Hoists
Hydraulic Machinery
Industrial Tractors
Irrigation Pumps
Loaders
Mining Machinery
Mowers
Pavers
Pumps
Road Building Machinery
Road Rollers
Road Scrapers
Separators
Sprayers
Stand-by Equipment
Stone-Gravel Crushers
Street Sweepers
Threshers
Tractors
Trenchers
Well Drillers
Winches

CONTINENTAL MOTORS · Power with which the Nation · AMERICA'S STANDARD

Continental Motors Corporation

Detroit and Muskegon, Michigan

Dependable Power for Every Purpose



IMPELLER BORE DETAILS

Detail Refinements Make the Difference!

AMSCO

Dredge Pumps outwardly look much the same as other dredge pumps, but analyze their design and construction and you'll find a dozen detail refinements that make a vast difference in performance and service life.

The unbalanced impeller nuisance has been minimized; side plates are secured by means of slotted flanges; shafts and bearings are built with load safety factors far in excess of load requirements; shaft and impeller bores are threaded when desired; bearings are amply proportioned; internal leakage and wear is minimized by "COUNTERFLOW" design. These and many additional features are available in almost all sizes and types of AMSCO Pumps, and most old pumps can be easily converted to take advantage of "COUNTERFLOW" design.

The AMSCO Line is complete: starting with small pumps for sand wasting, through the range of medium to large size sand and dredge pumps up to the large 20" Type "XH" Unit for use where the service abuse is severe, and where high heads and large solids are encountered.

No matter what your materials pumping job may be, AMSCO Pumps of Manganese Steel, "the toughest steel known," will return worthwhile profits in long-time, maintenance-free service.

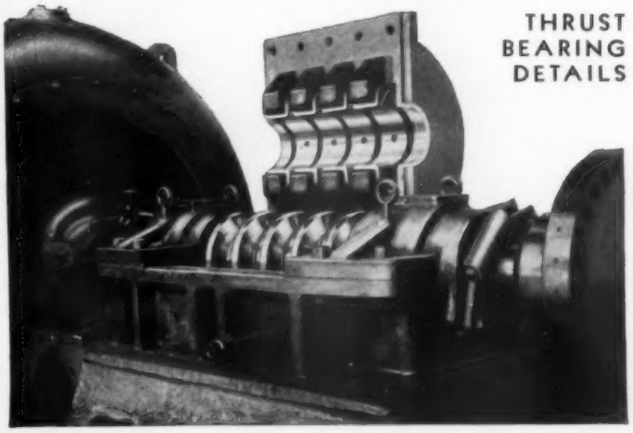
May we send you detailed bulletins on AMSCO Pumps, Cutter Heads and Dredge Fittings?

AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

396 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif.
Offices in Principal Cities



THRUST BEARING DETAILS

BUYERS' GUIDE

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*Chain Belt Co.
Chicago Steel Foundry Co.
Cross Engineering Co.
*Fuller Company
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Holmes & Bros., Inc., Robt.
Industrial Brownhoist Corp.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Patterson Fdry. & Machine Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.

Conveyors (Ready-Mixed Concrete)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Chain Belt Co.
Haiss Mfg. Co., Geo.
*Jaeger Machine Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors (Screw)
*Jeffrey Mfg. Co.

Conveyors (Vibrating)
*Jeffrey Mfg. Co.

Coolers (Clinker)
*Allis-Chalmers Mfg. Co.
*Traylor Engr. & Mfg. Co.

Coolers (See Kilns and Coolers—Rotary)

Couplings (Air, Hose, Pipe Etc.)
Independent Pneumatic Tool Co.

Couplings (Flexible and Shaft)
Erie Pump & Engine Works
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Cranes (Crawler and Locomotive)
*Austin-Western Road Machy. Co.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
*Link-Belt Co.
*Manitowoc Engineering Works
Northwest Engr. Co.

Cranes (Electric Traveling)
*Erie Steel Construction Co.
*Harnischfeger Corp.

Cranes (Overhead)
*Erie Steel Construction Co.
*Harnischfeger Corp.

Crusher Parts
American Manganese Steel Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
Carnegie-Illinois Steel Corp.
*Dixie Machy. Mfg. Co.
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Nordberg Mfg. Co.
Smith Engr. Works
Toro Manufacturing Corp.
*Traylor Engr. & Mfg. Co.

Crushers (Ring)
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
Toro Manufacturing Corp.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
New Holland Machine Co.
Toro Mfg. Corp.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Cutters
American Steel Dredge Co.

Derricks & Derrick Fittings
Clyde Iron Works, Inc.

Diesel Engines (See Engines—Diesel)

Diggers (Clay)
Independent Pneumatic Tool Co.

Dipper Parts
American Manganese Steel Co.
*Bucyrus-Erie Co.
Taylor-Wharton Iron & Steel Co.

Dippers and Teeth (Power Shovel)
American Manganese Steel Co.
*Bucyrus-Erie Co.
*Koehring Co.
Taylor-Wharton Iron & Steel Co.

Doors (Car)
Hummel-Foley Corp.

Dragline Cableway Excavators
*Good Roads Machinery Co.
*Link-Belt Co.
Page Engr. Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Austin-Western Road Machy. Co.
*Bucyrus-Erie Co.
*Erie Steel Construction Co.
*Harnischfeger Corp.
*Koehring Co.
*Link-Belt Co.
*Manitowoc Engineering Works
Northwest Engr. Co.
Page Engr. Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredge Engines
Clyde Iron Works, Inc.

Dredges
American Steel Dredge Co.
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Dredges (Dipper)
American Steel Dredge Co.

Dredges (Hydraulic)
American Steel Dredge Co.

Drilling Accessories
*Chicago Pneumatic Tool Co.
Independent Pneumatic Tool Co.
*Ingersoll-Rand Co.

Drill Bit Reconditioning
Rock Bit Sales & Service, Inc.

Drill Bits
*Ingersoll-Rand Co.
Rock Bit Sales & Service, Inc.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Armstrong Co.
Independent Pneumatic Tool Co.

Drills (Core)
Hoffman Bros. Drilling Co.
*Ingersoll-Rand Co.
Pennsylvania Drilling Co.

Drills (Diamond)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Hand-Hammer)
Independent Pneumatic Tool Co.
*Ingersoll-Rand Co.

Drills (Rock)
*Bucyrus-Armstrong Co.
Hardsocg Wonder Drill Co.
*Ingersoll-Rand Co.
*Jeffrey Mfg. Co.

Drill Sharpening Machinery
*Ingersoll-Rand Co.

Drill Steel
Independent Pneumatic Tool Co.
*Ingersoll-Rand Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.
*Chain Belt Co.

Dryers
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Dust Arresters
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Parsons Engineering Corp.
*Western Precipitation Corp.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
*Parsons Engineering Corp.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Fuller Company
*Parsons Engineering Corp.
*Western Precipitation Corp

Dust Filters
*Parsons Engineering Corp.
*Western Precipitation Corp

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.
*Fairbanks, Morse & Co.
I T E Circuit Breaker Co.

Electrodes (Welding)
Stulz-Sickles Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bonnot Co.
*Fuller Company
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.

Engine Generator Sets See Generator Sets (Engine).

Engines (Diesel)
Caterpillar Tractor Co.
Continental Motors Corp.
*Cooper-Bessemer Corp.
*Fairbanks, Morse & Co.
*Ingersoll-Rand Co.
*Nordberg Mfg. Co.
Page Engr. Co.

Engines (Hoisting)
Clyde Iron Works, Inc.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
Continental Motors Corp.
*Cooper-Bessemer Corp.
*Fairbanks, Morse & Co.
*Ingersoll-Rand Co.
*Nordberg Mfg. Co.
Page Engr. Co.

Engines (Steam)
*Ingersoll-Rand Co.
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Fabricating (Electric Arc and Oxy-Acetylene)
Smith Co., S. Morgan
Stultz-Sickles Co.
United Welding Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Chain Belt Co.
*Fuller Company
*Good Roads Machinery Corp.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Fuses (Detonating)
*Ensign-Bickford Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Hewitt Rubber Corp.
Republic Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gas Producers
Wellman Engr. Co.

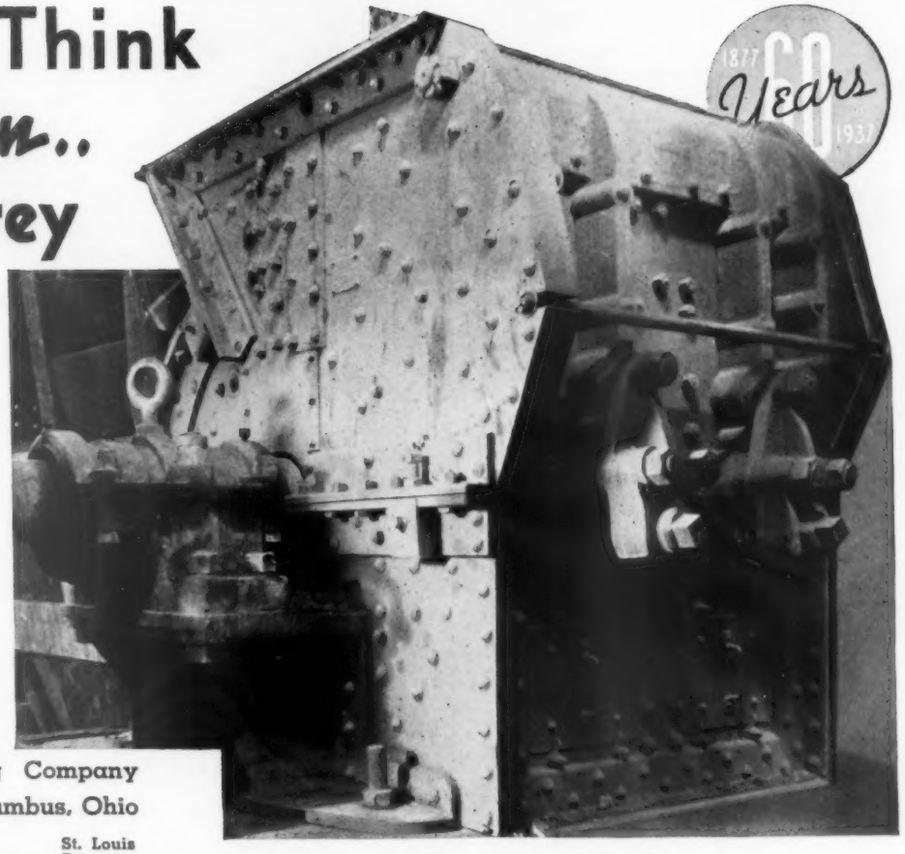
Gates (Bin) (See Bin Gates)

Gates (Clamshell)
Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
Bartlett & Snow Co., C. O.
*Chain Belt Co.

* See also information in the 1937 Pit and Quarry HANDBOOK.

When You Think of *Reduction*.. Think of Jeffrey



If you want to produce a better product . . . and do it with less power . . . we suggest you give Jeffrey swing hammer crushers and pulverizers a try. They will give you dependable day-in and day-out service reducing limestone, shale, clay, chalk, marl, gypsum, phosphate rock and asbestos rock.

With wide experience in reducing this class of material you can rely on the recommendations of Jeffrey engineers. They know the stone products field and build machines accordingly.

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Put Your Heavy Welding Up to Smith!
PROFIT by our experience in welding parts for the highest-powered Kaplan turbines ever built, *anywhere!* Benefit by Smith's facilities and quicker deliveries! *Write for Bulletin.*
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BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Lewistown Foundry & Machine Co.

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*Erie Steel Construction Co.
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Grating (Steel)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Hendrick Mfg. Co.

Grinding Balls (See Balls, Grinding)

Grizzly Feeders
*Jeffrey Mfg. Co.
*Traylor Engr. & Mfg. Co.

Grizzlies
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
*Good Roads Machinery Corp.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Bartlett & Snow Co., C. O.
National Wire Cloth Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Hoists
American Steel Dredge Co.
Bartlett & Snow Co., C. O.
Clyde Iron Works, Inc.
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Iowa Mfg. Co.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
*Sprout, Waldron & Co.

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.

Hose (Air, Steam and Water)
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Hewitt Rubber Corp.
Independent Pneumatic Tool Co.
*Ingersoll-Rand Co.
Republic Rubber Co.

Hose (Radiator-Engine Cooling)
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Hose Couplings (See Couplings)

Hulls (Steel)
American Steel Dredge Co.

Hydraulic Guns (See Guns—Hydraulic)

Idlers
American Manganese Steel Co.
*Barber-Greene Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Good Roads Machinery Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Kilns (Vertical)
*Hardinge Co.

Ladders
American Steel Dredge Co.

Lime-Handling Equipment
Bartlett & Snow Co., C. O.
*Fuller Company
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Hardinge Co.
Traylor Engr. & Mfg. Co.

Lime Kilns
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Liners, Car (Paper)
Hummel-Foley Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
*Barber-Greene Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Fuller Company
*Good Roads Machinery Corp.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
Toro Mfg. Corp.

Locomotives (Storage Battery)
*Jeffrey Mfg. Co.

Locomotives (Trolley-Battery)
*Jeffrey Mfg. Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
American Manganese Steel Co.
Manganese Steel Forge Co.
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Manganese Steel Castings
American Manganese Steel Co.
Manganese Steel Forge Co.

Manganese Steel (Plates and Sheets)
American Manganese Steel Co.

Mechanical Rubber Goods
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Hewitt Rubber Corp.
Republic Rubber Co.
Taylor-Wharton Iron & Steel Co.

Mill Liners and Linings
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Allis-Chalmers Mfg. Co.
*Hardinge Co.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mch. Co.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sprout, Waldron & Co.
Toro Mfg. Corp.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*Fairbanks, Morse & Co.
*Harnischfeger Corp.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Motor Trucks (Dual Rear Axle Drive Units)

Nails
*American Steel & Wire Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Chain Belt Co.
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Chain Belt Co.
*Deister Concentrator Co.

Packings
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Partitions (Wire)
National Wire Cloth Co.

Paving Mixers
*Chain Belt Co.
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
Cross Engineering Co.
*Hendrick Mfg. Co.
*Sprout, Waldron & Co.
*Wickwire Spencer Steel Co.

Pipe, Dredge (Floating and Shore)
Taylor Forge & Pipe Works
United Welding Co.

Pipe Flanges
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Pipe Forms (Concrete)
Quinn Wire & Iron Works
Universal Concrete Pipe Co.

Pipe Machines (Concrete)
Quinn Wire & Iron Works
Universal Concrete Pipe Co.

Pipe (Welded)
Taylor Forge & Pipe Co.
United Welding Co.

Plants (Aggremeter) (See Aggremeter Plants)

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Portable Conveyors
*Barber-Greene Co.
*Fuller Company
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.
*Robins Conveying Belt Co.

Portable Crushing and Screening Plants
*Austin-Western Road Machy. Co.
*Barber-Greene Co.
Bartlett & Snow Co., C. O.
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
Toro Mfg. Corp.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Precipitators
*Western Precipitation Corp.

Pre-formed Wire Rope
*American Cable Division of the American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
Williamsport Wire Rope Co.

Proportioning Equipment
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Jaeger Machine Co.

Pulleys (Magnetic)
*Sprout, Waldron & Co.

Pulleys (Wing)
*Sprout, Waldron & Co.

Pulverized Fuel Systems
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.

Pulverizers (See also Crushers, Mills, etc.)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bartlett & Snow Co., C. O.
Bonnot Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
Patterson Fdry. & Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
Sturtevant Mill Co.
Toro Mfg. Corp.
Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Pump Parts
Taylor-Wharton Iron & Steel Co.

Pump Valves (See Valves, Pump)

Pumps (Air-Lift)
*Fuller Company
*Ingersoll-Rand Co.

Pumps (Bulk Cement)
*Fuller Company

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Chain Belt Co.
Erie Pump & Engine Works
*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
Independent Pneumatic Tool Co.
*Ingersoll-Rand Co.
*Jaeger Machine Co.
Kansas City Hay Press Co.
*Morris Machine Works

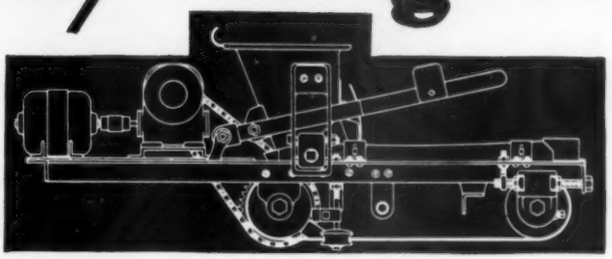
Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Bucyrus-Erie Co.
Erie Pump & Engine Works
*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.

* See also information in the 1937 Pit and Quarry HANDBOOK.

Feeds by Weight

and it's the only FEEDER that actually increases process capacity 10 to 20%



PUT one to work! You'll be amazed at the results, if you have been feeding by volume. You'll have no lost tonnage due to variation in size of material fed, changes in weight per cubic foot, bulking or segregation. Hundreds, who have replaced volume feeders with Hardinge Constant Weight Feeders, report astonishing increases in capacity and an accurate record of the weight fed—*and they back up their remarks with "repeat" orders!*

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More Efficient Separator
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Hammer Crushers
Air Separators
Vibrating Screens
Impact Mills

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Erie Pump & Engine Works
*Fairbanks, Morse & Co.
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Kansas City Hay Press Co.
*Morris Machine Works

Pumps (Slip)
Patterson Fdry. & Machine Co.

Pumps (Vacuum)
*Fuller Company

Ready-Mixed Concrete Plants
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Erie Steel Construction Co.
*Jaeger Machine Co.

Recuperators
*Manitowoc Engineering Works

Rock Drills (See Drills—Rock)

Rod Mills
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Patterson Fdry. & Machine Co.
*Traylor Engr. & Mfg. Co.

Rods (Welding)
American Manganese Steel Co.
Stulz-Sickles Co.

Roofing (Steel)
Carnegie-Illinois Steel Corp.

Rope (Wire) (See Wire Rope)

Rubbish Burners
Cross Engineering Co.

Sand and Gravel Handling Equipment
*Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sand Separators
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
Simplicity Engr. Co.
Smith Engr. Works

Sand—Lime—Brick Machinery
*Hardinge Co.

Sand-Settling Tanks
Bartlett & Snow Co., C. O.
*Good Roads Machinery Corp.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
Smith Engr. Works

Scales
Buffalo Scale Co.
*Fairbanks, Morse & Co.

Scales (Track or Truck)
Buffalo Scale Co.
*Fairbanks, Morse & Co.

Scrapers (Power Drag)
*Austin-Western Road Machy. Co.
Iowa Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Screens
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Audubon Wire Cloth Corp.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
Carnegie-Illinois Steel Corp.
*Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cross Engineering Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
*Hardinge Co.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
McLanahan and Stone Corp.
National Wire Cloth Co.
*Nordberg Mfg. Co.
*Portable Machy. Corp.
Productive Equip. Corp.
*Roebling's Sons Co., John A.
*Robins Conveying Belt Co.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
Taylor-Wharton Iron & Steel Co.
Toro Mfg. Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
Universal Road Machy. Co.
*Wickwire Spencer Steel Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
*Barber-Greene Co.
Bartlett & Snow Co., C. O.
*Deister Concentrator Co.
*Deister Machine Co.
*Good Roads Machinery Corp.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Portable Machy. Corp.
Productive Equip. Corp.
*Robins Conveying Belt Co.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Tyler Co., W. S.
*Williams Patent Crusher & Pulverizer Co.

Scrubbers
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

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Separators (Magnetic)
Exolon Company
Patterson Fdry. & Machine Co.

Sheaves
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Austin-Western Road Machy. Co.
*Chain Belt Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
*Sprout, Waldron & Co.

Shovels (Electric, Internal-Combustion and Steam)
*Austin-Western Road Machy. Co.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
*Link-Belt Co.
*Manitowoc Engineering Works
Northwest Engr. Co.

Siding (Steel)
Carnegie-Illinois Steel Corp.

Silos
*Chain Belt Co.
Marietta Concrete Corp.

Skip Hoists and Skips
*Allis Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
Clyde Iron Works, Inc.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Sleeves Dredge
*Cincinnati Rubber Mfg. Co.

Speed Reduction Units
*Chain Belt Co.
Iowa Mfg. Co.
*Link-Belt Co.

Spirals (Lowering)
Holmes & Bros., Inc., Robt.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
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Bartlett & Snow Co., C. O.
*Chain Belt Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Stabilized Road Mix
*Calcium Chloride Association

Stackers
*Jeffrey Mfg. Co.
United Welding Co.

Steel (Alloy)
(See Alloys—Steel)

Steel (Bars, Shapes, Plates, Etc.)
Carnegie-Illinois Steel Corp.

Steel Grating (See Grating, Steel)

Steel Plate Construction
Carnegie-Illinois Steel Corp.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
*Portable Machy. Corp.
*Sprout, Waldron & Co.
Taylor-Wharton Iron & Steel Co.

Stone Grapples
Owen Bucket Co.

Storage Equipment
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Erie Steel Construction Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Marietta Concrete Corp.
*Sauerman Bros., Inc.

Surfacers (Concrete)
Independent Pneumatic Tool Co.

Sweeping Systems
Allen-Sherman-Hoff Co.

Switches (Electric)
I-T-E Circuit Breaker Co.

Switches (Safety)
I-T-E Circuit Breaker Co.

Tanks
Bartlett & Snow Co., C. O.
*Hendrick Mfg. Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
*Portable Machy. Corp.
*Traylor Engr. & Mfg. Co.
United Welding Co.

Tanks (Sand-Settling)
Bartlett & Snow Co., C. O.
*Good Roads Machinery Corp.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Patterson Fdry. & Machine Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Thickeners (Slurry)
*Hardinge Co.
Patterson Fdry. & Machine Co.

Tire Repair Materials
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track & Track Materials
Taylor-Wharton Iron & Steel Co.

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.

Tramways (Aerial)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.

Transformers
*Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Good Roads Machinery Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Chain Belt Co.
*Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Tubes (For Tire Casings)
Goodyear Tire & Rubber Co.

Turbines
Smith Co., S. Morgan

Underground Loaders
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.

Unloaders (Box Car)
*Barber-Greene Co.
Bartlett & Snow Co., C. O.
*Chain Belt Co.
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Portable Machy. Corp.

Valves (Pump)
*Cincinnati Rubber Mfg. Co.
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
*Chain Belt Co.
*Link-Belt Co.

Vibrating Screen Plate
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
Cross Engineering Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
Independent Pneumatic Tool Co.
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Wagons (Dump)
*Austin-Western Road Machy. Co.
*Koehring Co.

Washers (Sand, Gravel and Stone)
*Austin-Western Road Machy. Co.
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
*Good Roads Machinery Corp.
Haiss Mfg. Co., Geo.
*Hardinge Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Patterson Fdry. & Machine Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
Universal Road Machy. Co.

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Erie Steel Construction Co.
*Fuller Co.
*Jaeger Machine Co.

Welding Bars, Wedge and Applicator (Nickel - Manganese Steel)
Stulz-Sickles Co.

Welding and Cutting Equipment
Smith Company, S. Morgan
Stulz-Sickles Co.

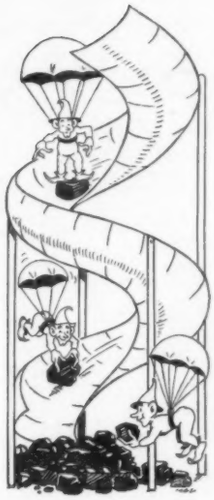
Welding Rods
American Manganese Steel Co.
Stulz-Sickles Co.
Taylor-Wharton Iron & Steel Co.

Welding Service
*Rock Bit Sales & Service, Inc.
Smith Co., S. Morgan
Stulz-Sickles Co.
United Welding Co.

Welding Supplies
American Manganese Steel Co.
*American Steel & Wire Co.
*Harnischfeger Corp.
*Roeblings Sons Co., John A.
Stulz-Sickles Co.
Taylor-Wharton Iron & Steel Co.
United Welding Co.
*Wickwire Spencer Steel Co.

Well Drills (See Drills—Well)

*See also information in the 1937 Pit and Quarry HANDBOOK.



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NO DEGRADATION

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Handle your sized material with Holmes Lowering Spirals. The gentle sliding descent of materials prevents breakage or degradation—saves you money and eliminates wastage. Operated by gravity these lowering spirals have no power cost.

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The smooth, durable hinged joint of Alligator Steel Belt Lacing is the most universally used of all belt lacings. Clinched teeth compress belt ends firmly, reducing destructive internal friction and ply separation. Twelve sizes in steel, "Monel Metal," and alloys for belts up to 5/8 in. Standard boxes, "Handy Packages," and long lengths.
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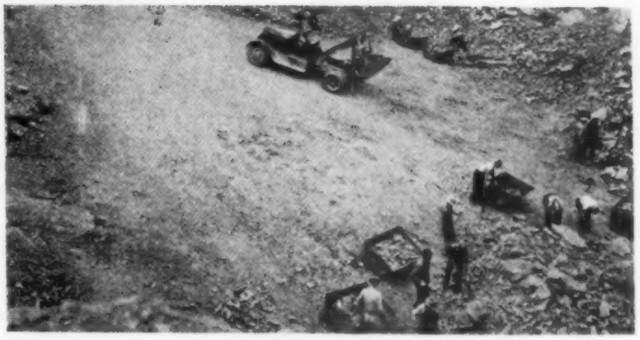
REG. U. S. PAT. OFFICE

DEMPSTER



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SAVE·TIME↓

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Detachable buckets are spotted at points of loading and filled while previously filled buckets are being hauled to destination.

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BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

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Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works
Iowa Mfg. Co.

Wheel Rims. See Rims—Wheel

Winches and Capstans
*Chain Belt Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Wire and Cable (Electric)
*American Steel & Wire Co.
*Roebling's Sons Co., John A.

Wire Cloth
Audubon Wire Cloth Corp.
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Taylor-Wharton Iron & Steel Co.
Tyler Co., W. S.
*Wickwire Spencer Steel Co.

Wire Rope
*American Steel & Wire Co.
Broderick & Bascom Rope Co.
*American Cable Division of the American Chain & Cable Co., Inc.
*Lescnen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.
*American Cable Division of the American Chain & Cable Co., Inc.

Wire Rope Fittings
*American Steel & Wire Co.
Broderick & Bascom Rope Co.
*Leschen & Sons Wire Rope Co., A.
Page Engr. Co.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.

Wire Rope Slings
*American Cable Division of the American Chain & Cable Co., Inc.
*American Steel & Wire Co.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.

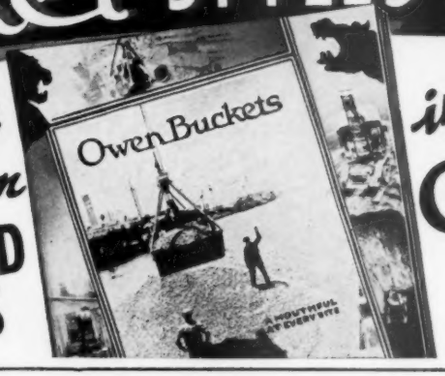
Wire (Welding)
American Manganese Steel Co.
*American Steel & Wire Co.
*Roebling's Sons Co., John A.
*Wickwire Spencer Steel Co.

Worm Gears (See Gears and Pinions)

* See also information in the 1937 Pit and Quarry HANDBOOK.

Bucket STYLES CHANGE ALSO

Get latest Information about ADVANCED MODELS



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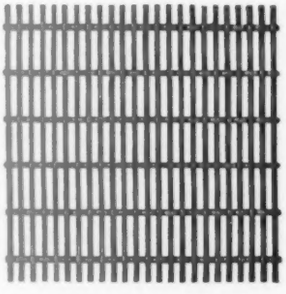
BERKELEY, CAL.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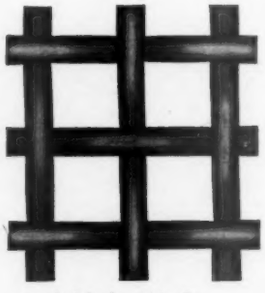
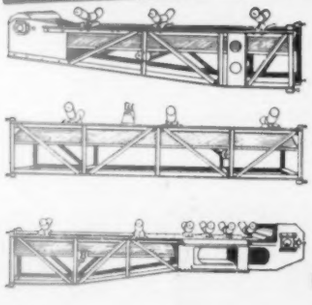

2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

NEW WAYS TO CUT MATERIALS HANDLING COSTS



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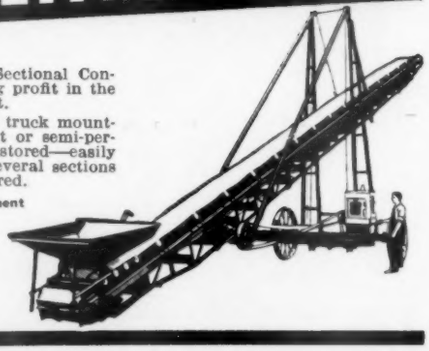
Our Catalog describes our complete line of Portable, Sectional and Permanent Conveyors designed to suit every Pit and Quarry requirement.



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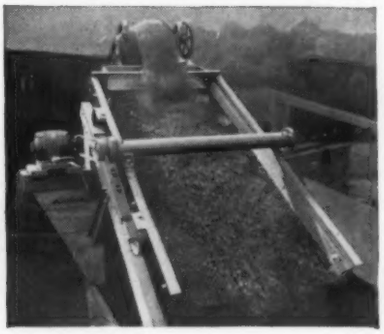

● All materials, fine or coarse, light or heavy... clay, gravel, sand, ores, crushed stone, coal, coke, fertilizer, grain, sugar, chemicals, pulpwood chips, etc.... yield to the wizardry of the mechanically-vibrated Link-Belt Vibrating Screen, and classify themselves in strict accordance with their size. Its uniform vibration keeps the meshes open, and makes the screen's entire screening surface 100% effective. Send for Book No. 1562.

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Digger, conveyor and elevator all in one. Handles from 10 to 250 cu. yd. per hour.

SAUERMAN BROS.

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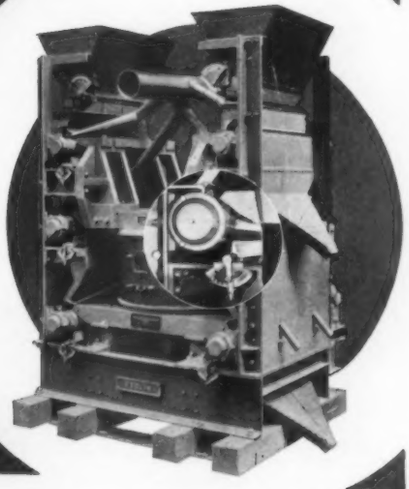
This shows the big, deep pit dug by a Sauerman Slackline in keeping a 1,000-ton-per-day gravel plant running for a period of years.

Hits the "Bullseye" EVERY Time!



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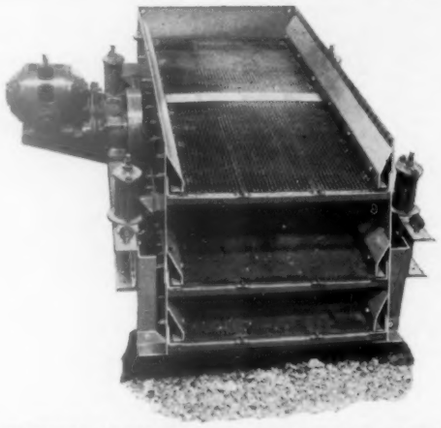
EXOLON *Magnetic Separators*



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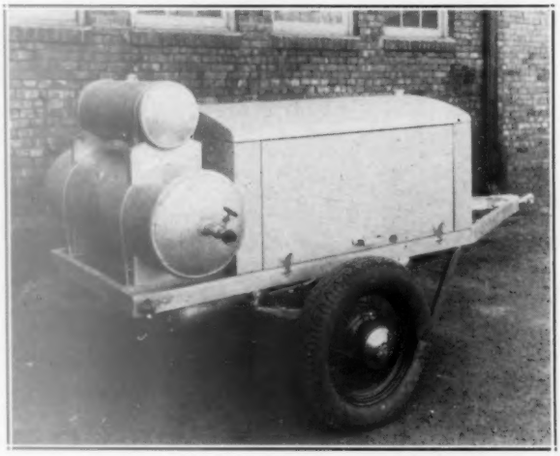

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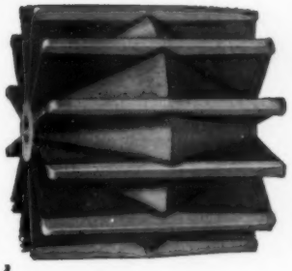

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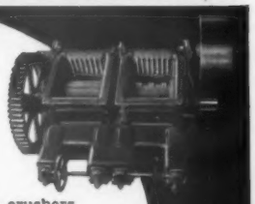

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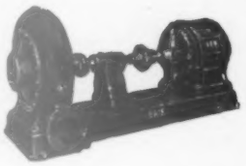

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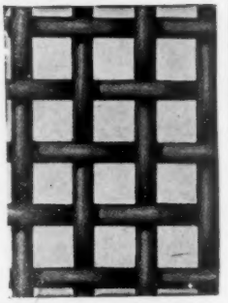

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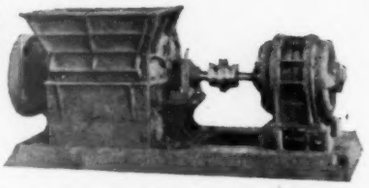

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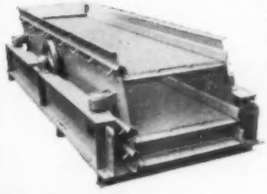

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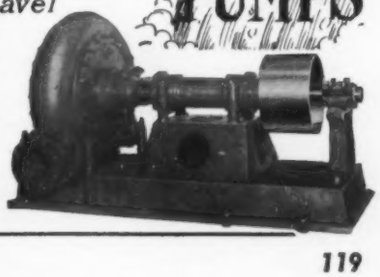

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3500 G.P.M. DeLaval Type 150 M.P. 10" 139.5 Head, coupled to 150 H.P. A.C. Motor, 2300 V. 1800 R.P.M. 3 ph. 60 cyc., with control.

A. C. Motors

3 Ph. 60 Cy.

H.P.	Make	Type	Volts	Speed
850	G. E.	Synch.	2300/440	720
500	G. E.	Synch.	440	1200
450	West.	Synch.	440	257
450	West.	S1. Rg.	2300	875/700
400	G. E.	S1. Rg.	2300/550	390
400	West.	S1. Rg.	2300/550	290
400	West.	S1. Rg.	2300	514
400	G. E.	S1. Rg.	2300	885
300	A1. Ch.	S1. Rg.	2300/550	585
250	G. E.	S1. Rg.	4000/2300	257
250	West.	S1. Rg.	440/220	585
250	F. Morse	S1. Rg.	2300/550	1200
225	El. Machy.	Synch.	4150/2300	450
220	G. E.	Synch.	2300	900
200	West.	Synch.	400	514
200	West.	Synch.	2300-550	1800
200	West.	S1. Rg.	2300	870
200	West.	S1. Rg.	440/220	900
150	West.	Synch.	4000/2300	1800

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1—Marion 1 yd. Steam crane 40' boom on cats.
1—Marion 15 ton gas crane 40' boom.
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1—Link-Belt K-44 shovel 50' boom, fairleads.
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1—Sullivan 310' portable compressor.
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15—2 wheel concrete buckets.
1—Ransome 27 E Paver.
2—No. 116 Chicago Pneumatic Paving Breakers.
2—1 yd. Insley bottom dump concrete buckets.
1—1 yd. Steubner bottom dump concrete bucket.
1—1 yd. Kiesler rehandling bucket.
1—¾ yd. Browning clamshell bucket.
1—¾ yd. Blaw-Knox bucket.
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1—Morris 8" dredge pump 150 HP. GE. mtr.
1—Morris 10" cent. pump 2250 GPM at 130' head.
1—Goulds 12" cent. pump 50 HP. GE. motor.
1—Thompson 6" self priming pump Waukesha motor.
2—Gardner Denver Sheeting Hammers.
2—Humdinger 6" self priming pumps, gas motor.
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1—Humdinger 2" self priming pump.
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3—No. 5 McKiernan-Terry Hammers.
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1—15 ton Clyde, all steel, "A" frame, barge derrick with 50 ft. boom, 30 ft. mast, 12 ft. dia. bullwheel, for hook work or bucket operation.
1—10 ton Insley steel stiff leg derrick, 80 ft. boom, 40 ft. mast, 16 ft. dia. bullwheel.
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3000 ft. 30 lb., 36 in. ga.

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7 Inch Newhouse & 60 HP Motor.
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1 Pioneer Model 300W Portable.

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8—Rotary Kilns; 6x60′, 8x110′, 8x125′, 8′6″ & 9′6″x150′.

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1—Butler bin, 3 compts., 100 yds., weigh batchers.
1—Batcher plant, Butler 125 yds., 3 compts., with weigh batch meters, cement bin, screw conveyor, etc.
1—Northwest No. 7 gas crane, 1¾ yds. cap. 70′ boom.
1—Lima comb. 1½ yd. shovel, 55′ crane boom.
1—Loraine comb. 1¼ yd. shovel and crane.
1—Loraine gas shovel, 1½ yd.
1—Byers gas 1 yd. Model 100 shovel and crane.
2—Osgood heavy duty steam, 1¼ yd. shovels.
1—Browning truck crane on Mack truck.
2—Locomotives, gas, 20 tons, 36″ ga. Whitcomb.
1—Locomotive, gas, 20 tons, 36″ ga. Vulcan.
1—Locomotive, gas, 4½ tons, 36″ ga. Vulcan.
25—Cars, 5 yards, two way dumps, 36″ ga.
10—Cars, 2 yds., steel V dump, 36″ ga. Conveyor belt systems, 20″, 22″, 30″ complete.
50—Rock drills, DCR-23, X59, X49, S70, others.
10—Concrete breakers, pneumatic.
30—"BARRE" pneumatic carving tools, BL, CL, DL.
1—Bucket elevator, 32′.
1—Air compressor, 514 cfm, 14″ x 12″, electric drive.
1—Air compressor, 900 cfm, Deisel drive, Worthington.
1—Air compressor, 1,200 cfm, I. R., type PRE-2, elec.
1—Screen, Telsmith vibratory, 4′ x 12′, 5 h.p. motor.
5—Motor trucks, 5 yards, dump.
2—Derricks, steel stiff legs, 15 tons, cap. 100′ booms.
4—Derricks, steel guy, 7½ tons cap., 75′ booms.

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Robins 30 in. Conveyor Idlers and Pulleys.
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36 in. x 60 ft. Belt-Bucket Elevator, Cont.
Centrifugal 3-Stage Pump, 500-g., 300 ft.-h.
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F-M Belted Centrif. Pump, 375-g., 77 ft.-h.
2 in. Centrifugal Electric Pump, 150-g., 150 ft.
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Johnston 50 HP Locomotive Boiler, 125-lb.
Mundy 2-Drum 15 HP Gasoline Hoist.
Mundy 2-Drum 25 HP Electric Hoist.
Schramm 120 ft. Compressor, 15 HP electric.
Hummer V-40 Heavy Duty Vibrating Screens.
Selectro 3-Deck 3x8-ft. Vibrating Screen.
Tyler Screen Generator, 15-cycle 8 KVA.
Clamshell Material Buckets, 1 and 2 yards.
Sturtevant Jaw Crusher, 10x15 in.
Farrel Jaw Crusher, 42x40 in., type E.
Haiss Dig. Truck Loader, on wheels, gas.
1,000 ft. 6-inch Threaded Water Pipe.
800 ft. 4-inch Threaded Water Pipe.

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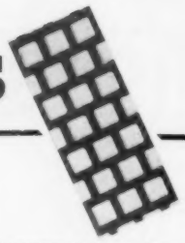

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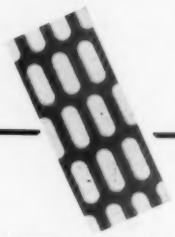

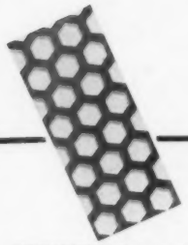

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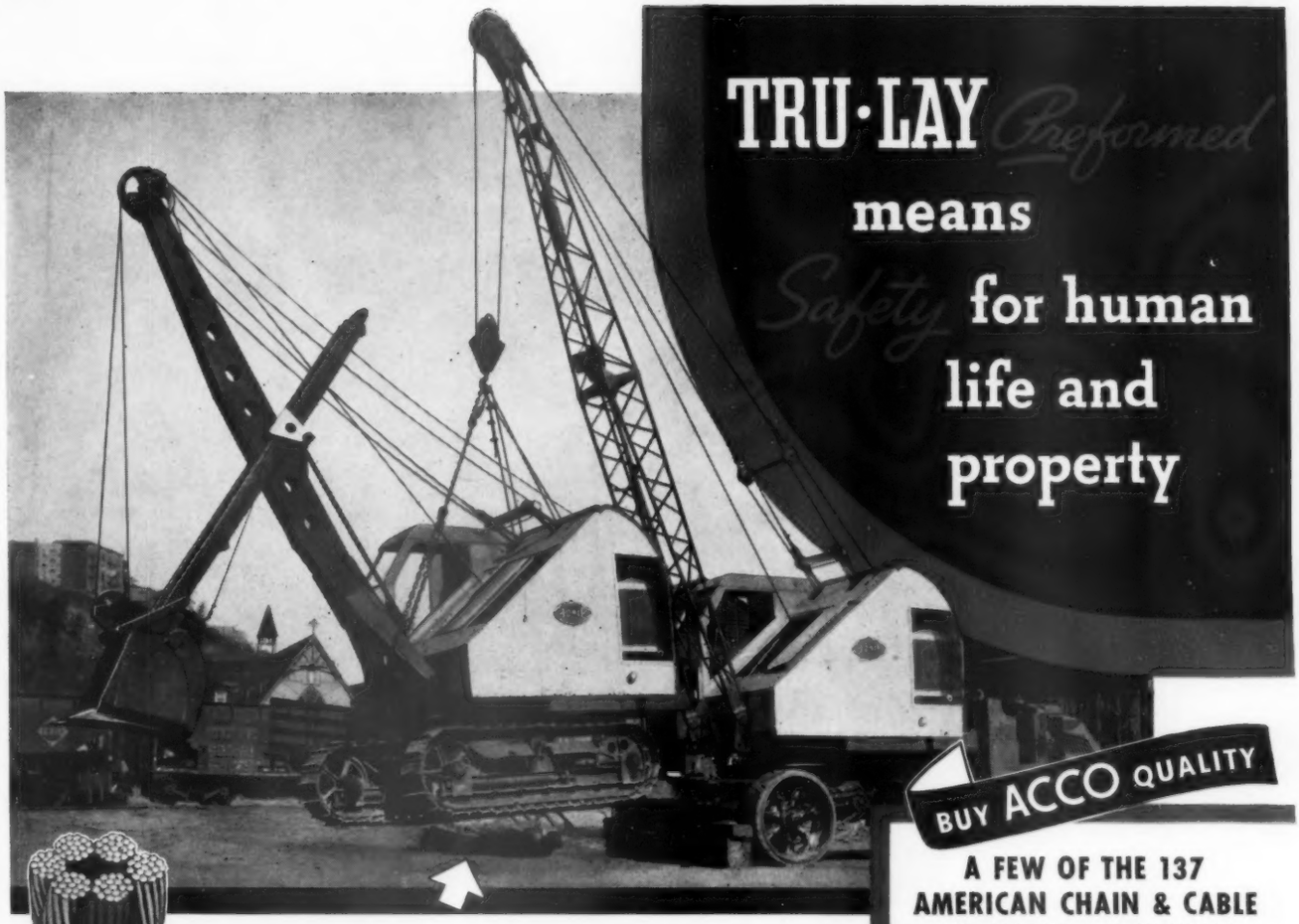

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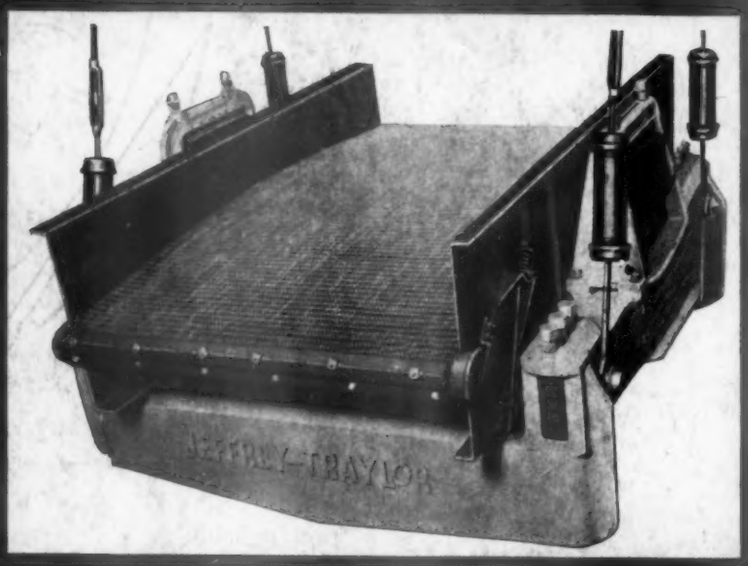

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